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ODONTOMES.

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Anomalies in tooth forms have ever been a source of interest to the histologist and pathologist, and did we include all forms of these growths under the head of odontomes we might conclude that they are by no means rare. If, however, we may restrict the term to those growths which are composed of tooth tissues, thrown together in a heterogeneous mass, and those made up of dentary bodies either remaining in nests formed by the follicular wall or held in one mass by cement—then, if the meagre reports of such cases found in the literature represent their frequency of occurrence, they are exceedingly rare.

In presenting this subject it is not intended to make an arbitrary classification in opposition to such learned men as Broca, J. Bland Sutton and others. It does seem, however, that for the purpose of a more simple differentiation we may remove with profit all classes of tumors from under the head of odontomes, excepting the kinds of growths above mentioned. These growths are so different in character and perhaps in origin from the others that they may be placed under one head and very properly be denominated odontomes.

Broca was the first to classify certain tumors of the jaws, including these kinds, naming them odontomes embryoplastiques, odontomes odontoplastiques, odontomes coronaries and odontome radiculaires, this classification having reference to the part of the tooth from which the tumor has its origin.

Sutton enlarged upon this and gave a classification based on the nature of the growth and the part of the tooth germ from which the tumor originated. His classification is;

Epithelial odontome, from the enamel organ.

Follicular odontome,

Fibrous odontome,

Cementome,

Compound follicular odontome,

Radicular odontome, from the papilla.

Composite odontome, from the whole germ.

} from the tooth follicle.

There is much to commend in this classification, but it is so broad that it may include many forms of growths which it would seem cannot, strictly speaking, be classed as odontomes, or tumors composed only of completed tooth tissues. It does not seem that there is justification in giving the name odontome to a tooth having an excessively developed crown or root, or to a tooth having a tumor on the side of the root, Fig. 1, or to a tooth having an enamel drop on the side of its root, or to a tooth more or less perfectly developed remaining in a thickened follicle, or to a tooth having its follicular wall thickened and calcified. Neither does it appear correct to include multilocular cysts of the jaws, excementosis of the root, impacted teeth, or unerupted supernumerary teeth under this head.

All of these are sometimes classed by writers on the subject as odontomes. Thomas' Medical Dictionary defines odontomes as "a sort of exostosis of the teeth." The Century Dictionary defines an odontome as "a small tumor composed of dentin formed in connection with a tooth. The name is applied more loosely to other hard tumors or growths of teeth, as to dental osteomas or exostoses springing from the cement." A tumor *caused* by a tooth is one thing, but a tooth tumor, that is, a tumor composed of tooth tissues, with no one tooth as a basis of the growth, is quite a different proposition. There may be some question as to whether those growths composed of nests of aberrant tooth forms ununited by cement, but included in a follicular cyst, should be placed under the head of odontomes. Since there is no difference in this class of tumors from those known by Sutton as composite odontomes, other than the absence of the cement, their origin probably being the same, it would appear that they may very properly be classed as odontomes. Sutton classifies these as compound follicular odontomes, but they are more generally referred to as dentigerous cysts.

Another form of growth very similar to the one just referred to, is made up of a mass of more or less perfectly formed diminutive

teeth, aberrant tooth forms and enamel drops. These are held in a more or less compact mass by a granular calcific material which seems to be imperfectly formed cement.

A third class, described by Sutton as a composite odontome, is seemingly made up, if viewed macroscopically, of a heterogeneous mass of enamel, dentin and this material having the appearance of imperfectly formed cement. There are no indications on its surface of tooth form; but when sections are cut from it and viewed microscopically, they present a surprising arrangement of enamel, dentin and cement, as will be seen later from the illustrations.

These three classes, if they may be so denominated, do not in every instance, and possibly never, originate from the germ of one of the normal set of teeth, but from some other source. They are wholly dissimilar in character to all the other growths commonly called odontomes. As to those which I should exclude from under the head of odontomes, there can be no doubt as to their origin, if supernumerary teeth are excepted. We know definitely that their origin is from some part of the germ of the teeth of the normal set which has been interrupted in its development.

I have found by experience that it is not safe to conclude that odontomes are always simply a malformation or abnormal development of the normal set of teeth. If this were universally true we should then find one tooth missing from the normal set if an odontome were present. I am unwilling to say that an odontome never originates in the stead of one of the normal set of teeth, but in two cases out of three occurring in my practice all the teeth of the normal set were accounted for. In the third case there was insufficient history on which to base a positive opinion. So far as I know, no one in his embryo-histological investigations has discovered to a certainty the origin of supernumerary teeth or odontomes, therefore all knowledge we have on the subject is purely speculative.

Dean theorized that the epithelial cord after its separation from the enamel organ might not in all instances be wholly absorbed, and that these unatrophied persistent portions of the cord might, in the presence of the underlying connective tissue, be able to stimulate in it an activity which would result in supernumerary teeth, and we might add, in those other growths under the smaller classification which I have designated odontomes. If this theory be correct, then the supposition that odontomes are simply the result of an error in

development of some one of the normal set of teeth does not necessarily follow.

Black has found in a few instances that there are additional buds given off from the epithelial lamina, and he suggests that these may be the origin of supernumerary teeth. If so, such buds may also account for odontomes as well.

Dermoids in parts of the body outside the jaws are supposed to be caused in some instances by inclusion of epithelial tissues during fetal development, and it may be that in the development of the jaws a part of the epiblastic layer is enclosed by the mesoblast, and supernumerary teeth and these nests of aberrant tooth forms, united or ununited, results similar to the origin of an epithelioma. However, the development in parts of the body outside the jaws of dermoids which contain hair and nails as well as teeth, sometimes in great numbers, though analogous, are not generally supposed to originate from a source similar to that of the so-called dentigerous cysts, or, as Sutton terms them, compound follicular odontomes of the jaw. Eve maintains that they are analogous to dermoids of the skin, ovaries, etc. Dermoids, according to Klebs, are classified as an endogenous form of tumor, that is, forms in which superficial tissues are retained in internal parts by a process of constriction. Teratomas he classified as ectogenous forms in which a separate fetal deposition is the origin of the tumor. Although the analogy between ovarian and other dermoids, and the so-called dentigerous cysts is striking, and one is inclined in some way to ascribe the genesis of these growths to a common cause, it appears to be the general opinion that the origins are different.

As before stated, there have been but few of the kind of growths I am describing reported, probably not more than a dozen all told. Some of those which have been classed in reports of cases as dentigerous cysts should have been placed under the head of odontomes. One such case was reported to this Association in 1875 by Dr. Edgar D. Swain; I described another case to the Chicago Odontographic Society, and there have been a few other similar cases reported under the head of dentigerous cysts.

Odontomes are generally found in the posterior portion of the jaws. Most writers on the subject say that they are more commonly found in the lower jaw. Two of the three cases I have seen were in the upper jaw. They are developed in early life, and as a

rule are observed before the twenty-fifth year. Odontomes rest in the jaw surrounded by a wall which in all probability in the majority of cases is the persistent follicular wall of the growth, expanded and thickened. In that class in which the dentary bodies are not united in a solid mass the follicular wall is spread out, forming nests in which the bodies rest. Sometimes these bodies have been found in great numbers. There were seventy-nine in my case referred to above. In this instance none of the bodies had a strong likeness to normally developed teeth. In other cases reported of this class, Swain's for instance, the bodies had the shape of very perfectly formed teeth, though diminutive in size, of cuspid and bicuspid types. Fig. 2 shows bodies removed by me from the growth previously mentioned. This came from the left side of the upper jaw of a boy twelve years of age. The tumor was located toward the buccal side of the jaw, all of the normal teeth were in place except the third molar, which was not yet erupted, but was found and removed at the time of the operation.

Fig. 3 represents a remarkable growth which I removed from the right side of the lower jaw of a young man at my clinic at Northwestern University Dental School during the last session. Fig. 4 shows the reverse side of this odontome. The history of this case, as given by Dr. Chas. S. Leininger of Chicago, who brought the patient to the clinic, is as follows: "Patient A. A., aged nineteen years, presented Oct. 7, 1900, for treatment for a supposed alveolar abscess, seemingly caused by a badly decayed right lower second molar. A large quantity of pus was drained off and the roots of the tooth removed two days later, the swelling of the gums disappeared shortly afterwards, and the patient had no trouble until six weeks later. The case showed at this time a condition similar to that when first seen, excepting for the absence of pus. I cut a considerable portion of the gum from the enlarged jaw and packed in borated gauze, expecting to find a third root, but in this I was disappointed. The opening I made relieved the patient of pain, but the enlargement gradually increased in size and extended buccally and distally. Two weeks after making the incision in the gum patient again presented with active inflammation of the part." When I first saw the patient the condition was as described by Dr. Leininger. On probing with a sharp-pointed explorer I made out a hard rough body which gave the characteristic sensation received when tooth tissues

are touched by an instrument. The body was too rough and large to indicate a tooth. The appearance of the gum and the discharge of pus, which was now present, indicated necrosis of bone, but the sensation communicated by the explorer clearly contradicted it. I at once concluded that an odontome was present. The first molar was in place, but loose from absorption of its roots, so was removed. The second molar had been removed by Dr. Leininger, and the third molar was not yet erupted. The jaw was much enlarged buccally and lingually. I made an incision anteroposteriorly and raised flaps of gums on both sides, exposing the jaw and a portion of the growth to view. The overlying process was cut away. I found most of the bone absorbed on the buccal aspect of the jaw and but little left on the lingual surface. With drills and cross-cut fissure burs I cut away the bone on the buccal side of the growth and also a part of that left on the lingual aspect, when the tumor with some difficulty was pried from its bed and removed, after which I found posteriorly at the bottom of the cavity the third molar seemingly perfectly developed. This odontome is the most remarkable one I have ever seen. It is composed of diminutive teeth, Fig. 5, more or less perfectly developed, of the incisor, cuspid and bicuspid types, and large numbers of denticles and enamel drops, cemented together within this oblong crescentic mass. This odontome measures anteroposteriorly 34 m. m., bucco-lingually 18 m. m., and from the crown rootwise 19 m. m.

Fig. 6 shows an odontome removed by me from the upper jaw during the past winter. The patient was twenty years of age. All the teeth were in place except the second molar. The first molar was loose from absorption of the roots caused by pressure of the odontome. The patient was quite sure that very recently he had had the second molar removed, but I saw no positive indication of this. This is the only one of the three cases in which I lacked positive evidence of the presence of the three molars, as well as all of the normal set of teeth on the side of the jaw in which the odontome was found. This case was sent to my clinic by a practitioner for an operation for necrosis, the odontome having been mistaken for a sequestrum of bone, which was not surprising, since the body had the characteristic brown color of necrosed bone, and there was much swelling and a flow of pus, with the dark colored gums. On probing the mass with a sharp steel instrument I readily discovered

that I was not dealing with dead bone but with tooth tissues, so diagnosed the case as an odontome. The jaw was much expanded buccally and somewhat lingually, causing considerable disfigurement on the outside of the face. The loose first molar was removed and the growth enucleated, but not until much bone was removed. Above and posterior to the growth, in the socket from which it was removed, was found the third molar perfectly formed. This growth is spherical in form, with an irregular surface caused by the protuberances. It measures in its greatest diameter 28 m.m. and in its least 22 m.m. It differs from the other in that there are no definite tooth forms visible, but enamel, dentin and cement irregularly placed, therefore it belongs to the third class.

Fig. 7 is another of the third class. This case was reported by Dr. Black to the Illinois State Dental Society in 1879. It is a somewhat smaller growth, measuring 24 m.m. from before backward, 20 m.m. from side to side, and 14 m.m. from root to crown. It is again presented, as Dr. Black ground sections from it, and from these sections Dr. F. B. Noyes has made photomicrographs and lantern slides which show most beautifully and perfectly the characteristic composition of this class. In the report to the Illinois Society Dr. Black said, of the histological appearance of these sections: "For the purpose of examining its structure I sawed it through, halving it in an antero-postero-perpendicular direction, and cut some sections. I found all the tissues of a normally developed tooth but in a state of confusion. Figs. 8, 9, 10, 11. There is entire absence of any proper pulp cavity. The disposition or arrangement of the tissues is peculiar and striking. It is as though there were a thousand teeth, exceedingly minute, growing as closely together as they could be crowded, and the interstices between them filled up with enamel and cement. In the field of the microscope, with the sections I have, we shall often be able to see a number of these diminutive teeth at a single view. Each has its own little pulp chamber in due form, its own separate dentin, and its own enamel cap, and plastered in and about and added on to those there is a considerable amount of both enamel and cement of very irregular formation. Many of the pulp chambers are partially filled with calcospherites. These also appear in many parts of the specimen in profusion. It is interesting to note the resemblance of this odontome to the normal structure of the teeth of some

of the lower orders of animals, especially some species of fishes, in which there are branching and radiating pulp cavities. These forms are well described by Chas. Tomes."

All writers on this subject agree that diagnosis of odontomes is generally difficult; usually they are not suspected until the growth is removed, and cases have been reported in which, through a mistaken diagnosis, sections of the jaw have been removed with the idea that a malignant growth was present, thus disfiguring the patient unnecessarily. With our present aid in the X-ray, together with the use of the sharp steel explorer and a well trained touch, it would seem that there could be no excuse for a repetition of the errors of the past, such as making exsections of the jaws when an odontome or impacted or encysted tooth is the disturbing cause, a condition in no case calling for so heroic and disfiguring an operation.

Discussion. *Dr. Thomas Fillebrown*, Boston: I do not remember more than one case during the last fifteen years in our section of New England which was analogous, and that was not an odontome but a dentigerous cyst. We also had one in which about thirty small teeth were found in the cyst. When this subject was discussed in the section the opinion seemed to prevail that the teeth were confined almost wholly to the bicuspid form, although some thought that the cuspid form was more predominant. Only one or two central incisors have appeared in these pictures, and it seems to me we might say that the teeth are practically all of the cuspid type, because the bicuspid is only a development of it. However, to make the distinction more marked we should notice the almost entire absence of molars, as only one or two cases have been reported in which molars were present, and those were the deformed conical molars, but that applies more to the supernumerary teeth than it does to those in these growths. I hardly see the distinction which the author makes between odontomes as tumors and tumors on the teeth, as a tooth which is deformed by more or less protuberances becomes an irregular mass of dentinal tissue, just as much as these odontomes do. I have seen these odontomes and would say that the larger one exhibited is as big as the end of my thumb. The little teeth of which it is composed can be seen very plainly, and there must be hundreds of them. The tooth substance predominates largely, there being just enough calcific matter to hold the mass together.

Dr. W. H. G. Logan, Chicago: It is correct to term cysts with one tooth dentigerous cysts, but when there are a number of teeth, as in the case of an odontome, it is not a cyst at all. I think an odontome is a tumor, and when we have one tooth involved within a membranous sac, that is a cyst. A tumor is a gradual growth of new tissue without any function to perform, which is what an odontome is. We have a proliferation of tissue, enamel and dentin, forming the tumor, which is an odontome. When we have the presence of a supernumerary tooth or a permanent tooth coming down, and it is lodged, as a result of that lodgment secretions arise around that body and act as an irritant. The irritation produces a fibrous sac which eventually encloses the teeth, and that is a dentigerous cyst. As regards the frequency, I have seen three dentigerous cysts and one odontome operated upon.

The most important point is the diagnosis. For fear that some might think infection or pus was a diagnostic symptom of odontomes or of cysts, inasmuch as it was mentioned in the paper as an accompaniment, I would say that in the presence of a cyst the foreign body is enclosed within a membranous sac. Under ordinary conditions there is no escape and we have no infection, but by and by we have a breaking down as a result of absorption.

The differential diagnosis between tooth structure and necrosed bone should be emphasized. This can be determined, as the essayist has emphatically stated, only by the use of a steel probe. When there is an enlargement, and you are in doubt as to what is inside of it, make an exploratory opening in every case before you operate. By listening quietly and feeling carefully you can determine at once what is present, as it is easy to distinguish between tooth structure and necrosed bone.

Dr. W. C. Barrett, Buffalo: I would call attention to the close relationship of the so-called supernumerary teeth to odontomes, dentigerous cysts and every thing of that character. We can learn much from comparative anatomy. I have a specimen taken from a colt in which there are nearly a quart of the denticles, some of them having the form of the anterior incisors, with that peculiar invagination of the enamel which gives the so-called age mark of the horse, and others having the characteristic crescentic infolding of the enamel which distinguishes his molars. From this we may learn that many of these peculiar growths are simply undeveloped

teeth, in one sense, and most of them are composed of true tooth tissue. Then, if we take up the so-called supernumerary teeth we find them to a certain extent following the same type. I think these latter are simply a return to ancestral developments. I believe the great archetype of dentition to be forty-eight teeth, which means that certain animals have eight molars in each jaw, others eight premolars, others six incisors and two cuspids. That is the greatest number of teeth found in any animal if we exclude the didelphia, which are themselves an exception as they belong to an entirely different class. No one has them all. At present no mammal has the eight molars and the eight premolars but some have six molars and eight premolars or vice versa. I have never seen so-called supernumerary teeth which made up a number to exceed the typical number of the teeth. In the molars of a human being I have seen the fourth molar distinctly and perfectly developed and in line with the others. I have seen it still more perfect in some of the nearly allied animals of the primates, especially in the gorilla and chimpanzee, but I never saw so-called supernumeraries which made up a number to exceed the four molars. Further, I have never seen in any other animal enough of the supernumerary teeth to exceed the eight premolars in each jaw, nor anything in the incisor teeth which made an excess in number of the six typical incisors. Consequently, it seems to me that they follow directly in the line of these others, but that in the dentigerous cysts so-called, or odontomes, it is simply a multiplication of denticles which should go to form one composite whole.

Dr. J. S. Marshall, Washington: I would say that this is the most important paper from the histological standpoint that has been presented before this association for a number of years. Dr. Gilmer stated that odontomes are exceedingly rare in the human family, which is true, as I believe only about fourteen cases have ever been reported. In the lower animals, however, these tumors are very frequent. I had one taken from the jaw of a colt and it was as large as my two fists, and another, taken from a young steer, was made up of probably hundreds of these denticles cemented together. Dr. Finley had a case which has never been reported. Dentigerous cysts are much more common than odontomes, and we often find the former to be caused by the misplacement of a single well developed tooth which cannot erupt. At other times we find these cysts filled

with denticles. The case which Dr. Gilmer recently operated upon had more denticles in it than any other on record except one, in which over three hundred were found. Mr. Sutton speaks of another form of tumor—a follicular odontome which seems to be made up of a large number of small cysts, the cancelli of the bone apparently forming these cysts and enclosing a large amount of fluid but never any denticles; simply an enlargement of the cells or cancelled structure of the bone. The diagnosis of these odontomes is often difficult, for usually they are deeply imbedded. In the only case of the kind which came under my notice I discovered the mass with the steel probe by the sense of touch. In all other cases of which I have read the surgeon has tried to determine the character of the tumor with a silver probe, but it cannot be done. I also attached one end of a small piece of rubber tubing to the probe and the other end to an ear-piece. By placing the latter in my ear I was able to hear distinctly the peculiar sound given off, as well as to feel with my fingers the sensation imparted, when the probe came in contact with the odontome. This conglomerate tissue neither feels like bone nor gives off the sound of bone when touched.

Dr. M. F. Finley, Washington: Dr. Marshall has spoken of the case in my practice of a bulbar odontome. The patient, an adult female, presented to have a loose tooth removed. In fact, it was so loose that it would no doubt have dropped out in a short time, not being covered in any way by either soft or bony tissue. There was no swelling of the jaw. The odontoma was located on the tuberosity of the right upper maxillary bone, in the position of a third molar, and the surface of attachment was concave with radiating serrations, something like the under surface of a toadstool. When the mass was removed so much odor came from it that I immediately threw it in the wash-basin and turned on the water, not realizing its true nature. Some time elapsed before its character was revealed, and the patient being a transient I could not obtain any history of the case. On one surface of the mass there was what appeared to be a molar-shaped tooth, considerably curved in its outline and having a large foraminal opening. There was also a great deal of tartar attached.

Dr. Gilmer, closing discussion: I must disagree with Dr. Fillebrown, as there is a great difference between a tumor growing out from the side of a root and an odontome. If we have in the development

of the papilla an extrusion of a part of this organ, we may have just such a tumor as has been spoken of, and it would certainly bear no sort of similarity histologically or otherwise to an odontome. I said little about the diagnosis of these tumors, because I did not wish to tire you, and as I tried to keep the paper within bounds I did not go into the question of comparative anatomy, nor consider these growths in the lower animals. Dr. Barrett states that forty-eight teeth are the type, and that there are never more of these bodies than would correspond to the original type. If he will examine closely one of the specimens I have here he can count three or four times that many, and they may all be separated.

Dr. Barrett: True, but together they make up but the one. An odontome is simply a multiplication of a single one and should be counted as such.

BACTERIOLOGY.

BY C. N. PEIRCE, D.D.S., PHILADELPHIA. READ BEFORE THE NATIONAL DENTAL ASSOCIATION, AT MILWAUKEE, AUG. 6-9, 1901.

Occurrences which are obscure or have causes not immediately obvious we term phenomena. When time and experience reveal their application to the economy of life they are termed natural law. Not infrequently the development of the individual to unravel the mystery and demonstrate its value to present and succeeding generations is tardy in materializing.

The solar system waited many centuries for Galileo, Kepler and Newton to satisfactorily explain its structure, operation and complex movements. Fabricius, Harvey and Malpighi made generation, physiology and anatomy of the human body comprehensible by years of patient study. Franklin, by interrogating the lightning in the clouds, made electricity the servant of man, and in the transmission of thought it annihilates time and space. Buckland, Lyell and Agassiz bore eloquent testimony to the natural but sublime history of the rocks and fossils, and the age of man and animals was greatly extended. Cuvier, Carpenter and Spencer elaborated the principles governing society and the trend of the simple to the complex, and established the sciences of biology and sociology. Lamarck, Darwin, Wallace and Huxley demonstrated descent with modification and established the origin of species and principles of evolution. Cope, Leidy, Le Conte and Marsh faithfully studied

laws of development, vertebrate zoology, paleontology and comparative anatomy, and established the close relationship between animals. Farady and Tyndall established the movements of the glaciers, studied the drops of water, the rays of light, and proved the reign of natural law.

M. Louis Pasteur, engrossed in his experiments of crystalline facets in the tartrates and paratartrates, and in the molecular symmetry and dissymmetry of crystals and the range of chemical processes apart from the play of vitality, had his attention directed to ferments by a German manufacturer of chemicals, who found that mineral substances sullied with organic matter of various kinds fermented when dissolved in water and exposed to summer heat. In this solution Pasteur discovered the fermentation due to the multiplication of a microscopic organism which in the liquid found its proper aliments. In this little organism he recognized a living ferment, which on examination he believed to be analogous to the yeast plant—the alcoholic ferment to which his attention had been directed by Schwann. Following this Pasteur made some remarkably successful experiments with the seeds of the common mould, *Penicillium Glaucum*. This brought the noted scientist unexpectedly amid the phenomena of fermentation, and that ferments in all cases are living things was his conclusion, also that the substances formerly regarded as ferments are in reality the food of the ferments.

He proved the ferment of lactic acid to be an organism of one kind, that of butyric acid to be one of a different sort. Following this he was led to the belief that the capacity of an organism to act as a ferment depended on the solution in which it was immersed, and also its power to live without air. The fermentation of beer suggested to him this idea. The yeast plant, like many others, can live either with or without free air. In contact with the latter it is spared the labor of wresting from the malt the oxygen required for its sustenance. He finally divided these microscopic organisms into two great classes which he named respectively aerobies and anaerobies, the former requiring free oxygen to maintain life, the latter capable of living without it, but able to wrest this element from its combination with other elements.

It is to Schwann, however, that the scientific world is indebted for the first successful effort in sterilization. He placed decoctions

of meat in flasks, boiled them, then supplied them with calcined air, the power of which to support life was unimpaired, yet fermentation or putrefaction in these vessels never occurred. Hence, the legitimate conclusion was that putrefaction was not due to contact with air but to something suspended in the air which heat would destroy. This something consisted of living organisms, which nourished themselves at the expense of the organic substance and caused its putrefaction.

The acetic fermentation was next studied, and was found to be the result of a minute fungus, the *Micoderma aceti*. By this the sugar of the grape-juice is transformed into carbonic acid and alcohol, the latter remaining in the wine. The manufacture and maladies of wine occupied his serious attention. Each of the disorders of wine was traced to its specific organism, which, acting as a ferment, produced substances agreeable or otherwise to the palate. Through the influence of the illustrious Dumas, Pasteur took up the investigation of the diseases of the silkworm at a time when this industry was in a state of ruin. Acquainted as he was with the work of living ferments, he was prepared for any emergency. Within the circulation of this insect he discovered the cause of the epidemic. The diseased corpuscles he followed through all the phases of insect life, the eggs, the worm, the chrysalis, the moth. In the latter it reached development so distinct as to render its recognition immediate. From healthy moths healthy eggs were sure to spring; from healthy eggs, healthy worms, and so on through the cycle of changes. By care in feeding, and isolation of diseased from healthy worms and eggs, the difficulty was surmounted and the industry reestablished. It was no hypothetical problem, the trouble was in a definite organism. Wherever ferments are utilized the microscope and results must test the quality of the true torula or yeast plant. The germ theory of infectious diseases was the result of the researches of Pasteur and Schwann. Pasteur was not a physician, and he did not feel himself called upon to trench upon the domain of the healing art, but by his studies and experiments he established the parasitic character of the several diseases affecting fowls, sheep, dogs and cattle.

The work, so valuable, done by Dr. Koch on splenic fever (malignant pustule) with the life history of *bacillus anthracis*, the contagion of this fever, is but a service in honor of Pasteur. The

recital of the foregoing evidences of increasing knowledge show that the demands of the age have daily utilized all that has been evolved, until the philosopher's stone and the transmutation of metals are relics of the past.

Alcoholic fermentation was for many years supposed to be the seat of active, spontaneous, self-regulated change; its results were known but its origin and processes had not been revealed. The chemist assumed that the decomposition which took place was due to the aggressive action of the oxygen of the air and the preventive process was simply its exclusion. On the publication of Pasteur's work this spontaneous idea entirely passed out of mind, though it had been accepted as a fact by even scientific men who held that it was the simplest explanation of the origin of the swarms of microscopic organisms observed in putrefying liquids or infusions. When we recall the universal ignorance concerning the nature and complexity of various forms of life and note the utter unreliability of any theory regarding them, it is not surprising that abiogenesis should have been held so firmly in favor and with so much confidence. Yet Leeuwenhoek, a microscopist of marked ability for his time (the seventeenth century), held that the entire absence of abiogenesis in the higher forms of life made it very improbable that the lower or even lowest should have such an origin; these conclusions, while not based on any recognized scientific evidence, were certainly wise even though intuitive or instinctive.

The germ theory of disease has done much towards relieving the world of a sorry superstition. Pestilences, epidemics and plagues are now, with scarlet-fever, measles, small-pox, whooping-cough and numerous other diseases with which the human family are afflicted, looked upon as due to natural causes rather than as the visitation of an angry God.

Bacteriology has been defined as a subdivision of microbiology and as the science of the culturable microorganisms, but it must not be inferred that all such organisms are harmful to more complex or highly organized beings. The number of those that are not only benign but quite essential to the life of man is greatly in excess of the harmful or malignant types. It would be difficult to conceive of the condition of our environment were we but for a limited time to be deprived of the helpful though unseen activity of the myriads of these organisms. Prof. W. S. Sedgwick brings this

matter clearly before us when he refers to their influence in the following terms: "Without their activity the habitable world and the sea would become one vast charnel-house, because there would be no adequate agency for mineralizing dead matter. * * * We have only to think of their helpful and wholesome unseen activity in removing from our view the dead animal bodies which would otherwise cover the earth, the dead leafage of the autumn, the worn-out trunks of trees, and the waste matter of human and animal life, in order to appreciate in some measure their fundamental importance in nature. When to this we add their tendency to cause the destruction of valuable organic matter, such as food and timber; their function in producing those fermentations, putrefactions and poisonings of the human body which we know as epidemics, plagues, pestilences, infectious diseases, suppurating wounds, gangrene and the like; when, furthermore, we consider their causative participation in such universal, familiar and important processes as bread-making, brewing, vinegar-making, the fermentation of milk and its products, butter-making, cheese-making, lactic-acid manufacture, tanning and nitrification, we are in a position to understand something of the scope and significance of the culturable microorganisms, and therefore of bacteriology from a practical point of view."

With these important facts before us it should be borne in mind that microscopic life is in its largest influence beneficent to humanity, and the varieties associated with disease are comparatively few in contrast with the others. While these minute organisms have been definitely identified with special diseases, many have serious doubts as to whether it has been satisfactorily demonstrated that they are the cause and not the product of the condition. The presence of these organisms in nearly all diseases is fully recognized, but their influence, as we see, is somewhat conjectural. The query is, will future generations modify the modern teaching?

From published reports we learn that physicians have much difficulty in establishing positively the absence or presence of the bacilli in certain diseases, hence the embarrassment in declaring that the disease does not exist, yet their presence would be considered positive evidence of the disease. This difficulty must be a great source of confusion to the diagnosticians, and must be increased by another uncertainty mentioned in their reports, namely, that they, the bacilli, vary greatly in number within a

limited time. Another serious difficulty encountered is that bacilli have been found on nasopharyngeal surfaces and on the tonsils when there has been no systemic disturbance, and also after serious trouble has subsided their presence has been recognized. If these statements are correct they must add to the uncertainty of the influence of the germs and make them a precarious feature of a diagnosis.

The origin of bacteria and the study of bacteriology have been an extremely interesting scientific feature in the last thirty years. The scope or field is broad and valuable, offering great compensation for laborious and painstaking cultivation, but this must be done with a full appreciation of the danger of careless and hasty conclusions.

Discussion. *Dr. C. P. Pruyn*, Chicago: Several years ago we went to the other extreme, but of late we have been taking a more conservative view of the part that bacteria play in disease. Indeed, physicians generally are drifting somewhat to the other extreme, and are beginning to see how large a sphere is occupied by clinical evidence, signs and symptoms in the treatment of disease. Perhaps we have laid too much stress on bacteriology and have neglected the influence of that clinical experience upon which our fathers placed such dependence. The pendulum has now swung back to its proper place, and we are beginning to realize that we should use both the old-fashioned signs and symptoms and the bacteriological presentation of each case before we can with certainty diagnose the trouble and remedy the diseased conditions.

SPLINTS FOR RETAINING LOOSE TEETH.

By W. V-B. AMES, D.D.S., CHICAGO. READ BEFORE THE NATIONAL DENTAL ASSOCIATION, AT MILWAUKEE, AUG. 6-9, 1901.

In really desperate cases of pyorrhea the matter of first importance is the satisfactory mechanical fixation of the loose teeth, without which all scaling and medicinal treatment will amount to little.

Had the title of my paper remained as first given to the chairman of the section—"A Properly Constructed Bridge the Ideal Splint for Loose Teeth"—my entire claim would have been embodied in the title and there would have remained only the effort to prove the ground well taken. My excuse for presenting to you a paper on this subject still is that I feel that sufficiently radical means are

not adopted for the mechanical fixation of loose teeth affected by some form of pyorrhea. I claim that the tying or binding with ligatures, silk or metal, with or without a gold blank struck up to fit the lingual or palatal surfaces of the teeth; the fitting and soldering together and cementing upon the teeth of thin gold bands, which should follow the line of greatest circumference of the tooth crowns, or the use of ligatures reinforced with celluloid in solution, as was advocated by Korwarska last summer at Paris, are all trifling make-shifts and should be employed only as emergency procedures.

I claim that within certain extreme limits in pyorrheal conditions, when edentulous spaces need to be filled, the indications for cutting teeth off at a point near the gum line, properly forming the roots, and constructing a bridge fitted with extreme care and judiciously antagonized with the occluding teeth of the opposite jaw, are forcible almost in proportion to the hopelessness of the case. This will be looked upon by probably a large majority as a very radical and unjustifiable practice, but acting upon this belief for about five years has given me results which have been out of all proportion to the outcome of less radical procedures.

In pyorrhea cases in which a few or many teeth are loose without the complication of edentulous spaces, or even when an occasional tooth is missing, a very efficient splint can be constructed after devitalizing, as a general rule, by fitting plates to a surface of each tooth and a dowel to enter the pulp canal, and assembling these by soldering. Such attachments can be made to carry a few dummies very satisfactorily, and the aggregation could be properly called a bridge. A few forms of such appliances have been described and illustrated—that of Dr. W. L. Fish, shown in July *Cosmos*, I can readily understand was efficient.

In making an appliance for any case in which there are teeth so loose that their retention calls for some radical procedure, I believe that the first consideration should be the devitalization of the pulps of the affected teeth. A loose tooth with a vital pulp is generally a source of neuralgia, so for various reasons is better pulpless. Of the more or less firm teeth which are to be included in the apparatus for stability, the pulp may often be left in situ with safety.

There seem to be natural advantages in favor of constructing bridges upon loose roots in the lower jaw, while in the upper the same cause might not be indicated. I refer to the simple force of

gravitation. It is fortunate that pyorrhea, etc. most often affect the teeth of the lower jaw, and of that set the incisors. However, by careful attention to articulation of an upper bridge built upon loose roots much can be expected of them. By attending carefully to the frequent sealing, and by the use of hydrogen dioxid as a mouth wash, I have come to expect to extend the usefulness of such a denture many years. Even with neglect after the insertion of such an appliance a case will do astonishingly well, as the tissues will usually tolerate abominably rough and ragged roots if they are immovably fixed in their sockets by means of a mechanical appliance.

I wish to describe in detail only one appliance which I think is sufficiently novel to warrant it. The construction of this depends upon the practicability of using natural tooth crowns, after they have been amputated from their roots, for mounting upon a metal frame-work of a bridge. This use of the natural tooth crown I consider most often warranted when treating looseness of the six anterior lower teeth, as they are probably the most difficult to reproduce satisfactorily in porcelain, and the occlusion usually comes upon them in such a way that they are a support and brace to each other. Each is the keystone of an arch, while the reverse is usually the case in the anterior region of the upper jaw. Very often these lower teeth are abraded and so stained that their reproduction in porcelain is not easy, and when they have occupied positions not in regular alignment a much more pleasing result can be obtained by remounting the natural crowns.

Before amputation of a crown an impression should be taken of the incisal edges of the tooth to be amputated and of one or two on each side, as a guide in replacing the crown if the original arrangement is to be carried out. Selecting the line at which we wish to amputate the crown, a spear drill is passed through the center from labial to lingual, and with a small fissure bur the excision is made laterally from this perforation.

After shaping the root portion as if for an ordinary case of banding for crown, take a measurement and cut material for a band of the combined widths of the bands desired upon root and coronal portions. After fitting to root and giving the entire band this general form it is well to take an impression of the gingival end in some sort of firm material to preserve its shape while fitting into it

the coronal portion, which has been beveled slightly and the pulp canal which has been enlarged to receive a No. 17 wire. By cutting out the coronal edge of the band labially and lingually the tooth crown can be readily forced into it, there being usually the necessity of slightly stretching the margin lingually and labially to suit the natural enlargement of the crown just above the point of amputation.

With crown in band place these two parts in position upon root to assure proper relations. When these have been secured, mark upon the outside of band a line corresponding with the termination of the coronal portion within. This I can best do with an instrument identical in construction with an artery forcep. By placing one beak of an artery forcep against the cervical end of the crown, and the other beak against the outside of the band, the termination of tooth crown within can be readily outlined upon the outer surface of the band.

A diaphragm is now to be inserted at this line. A flat saw is selected of a thickness corresponding to the gauge of gold intended for the diaphragm. The band is so nearly divided, following this line, that the saw begins to mark the inner surface of the band at a point opposite that at which the sawing was begun. A flat piece of gold of the selected gauge—I prefer about 29—can now be inserted in this slit and easily fastened at all points with a small amount of high-grade solder. This diaphragm I prefer to have extend labially and lingually to such an extent that it will act as a support to the proper amount of solder for strengthening the part and on the one approximal aspect to such an extent that it will come into contact with the adjoining similar part to facilitate the final assembling.

The next step is the placing of a dowel through the diaphragm into the prepared pulp canal of the tooth crown. The soldering of this dowel, which in case of an incisor is cut to be flush with diaphragm, and in case of a cuspid would extend into root as well, is the most delicate and difficult part of the process. I feel that I can best do it with the oxyhydrogen flame.

After these details have been carried out with all of the teeth which it is intended to include in the appliance, they are placed upon their roots and an impression is taken; the crowns are then put aside and the parts assembled, the individual parts being strengthened at this time, or having been strengthened separately

before assembling. Before cementing the tooth crowns into their sockets, I find it an advantage to drill a small canal from one approximal surface, which will be just covered by the band, to the enlarged pulp canal of the crown, this to be a vent to facilitate the cementing process. After cementing all tooth crowns into their sockets and finishing you have a bridge which in its final setting does not differ from any other, except in the looseness of the roots which necessitates the use of a cement which sets satisfactorily from a thin consistency, such as an oxyphosphate of copper.

If, as will sometimes be the case, it is desirable to give a tooth crown a different position from that which it has occupied, the root and coronal portions are banded, coped and doweled separately, and these so united as to give the crown the desired position. This method may by some be considered best in cases in which the position of crown is not to be changed. The first described plan is apt to be the more expeditious. The parts of single teeth can be temporarily put together and worn by ligating, while other teeth are being gotten ready for the final assembling of all parts. This procedure is not a short cut method. It will require several appointments for its completion and will of course be too extravagant for some of our clients. I present it as an efficient means of accomplishing an end in a desperate condition. The advisability of its adoption must be decided after consideration of the exigencies of the case.

Discussion. *Dr. N. S. Hoff*, Ann Arbor, Mich.: I have no criticism to make on the mechanical construction of the bridgework or splint advocated, but this is not very conservative practice. The idea of treating these desperate cases of pyorrhea with some sort of a steadying appliance is all right, provided that the apparatus is not given the permanence which this method of treatment indicates. It seems to me that the essayist has gone too far in making a sacrifice of tooth crowns, to say nothing of the other tooth tissues, and I do not believe in always destroying the pulp. When this form of a bridge is inserted the healthy teeth are permanently mutilated, as it is intended to serve as a fixture until the teeth are finally lost. Consequently, this method is not the proper therapeutic treatment of the disease. Therapeutic intervention is usually directed to the restoration of a normal condition for the time being only, and when this has been accomplished, so far as the gums and disease of the alveolar process is concerned, we expect nature to take charge and

maintain a healthy function. Dr. Ames' method is surgical only, and when the normal condition has been restored the bridge must be retained. Again, by fastening these teeth together in this way we abolish entirely one of their most important functions, the individual tactile sense, which enables us to appreciate with the teeth the value of food particles taken into the mouth, to say nothing of the certain destruction of their individual occlusion. There are other methods of attaching splints which will serve the same purpose, and if desirable they can be removed at a later date, allowing the teeth to resume their natural function. Finally, while the essayist may be right in stating that by this method the possibility of the neuralgia often associated with this condition is overcome, there are other ways of preventing excessive sensitiveness, and there is little necessity for destroying the pulp to accomplish that object.

Dr. W. F. Litch, Philadelphia: I think Dr. Ames' operation is too radical for splint purposes pure and simple, and for the typical case which he seems to have in mind, the six or even the four lower anterior teeth, as there are simpler and less destructive splints which might be applied to greater advantage. In a case of this kind, if simple ligatures were not indicated I should prefer to make upon the lingual surface of the lower incisors a series of plates carefully burnished to each tooth, the plates being soldered together, making a continuous one which would be accurately adapted to the individual teeth. The plate could be perforated between the teeth and ligatures could be passed through and tied upon the labial surfaces of them. They might be of thread, but preferably of wire. Such a plate could be fastened in position with gutta-percha, to protect the tooth surfaces. The only palliation for the operation described by Dr. Ames in the average case is the assumption that the presence of metallic bands beneath the gum around teeth affected with pyorrhea is a salutary measure, in that it sets up certain processes, possibly galvanic, and destructive to organisms. However, the presence of the metallic band beneath the gum-line might be secured in some other way. I like the essayist's idea of using natural teeth, and have several times employed that method. I remember particularly two cases in which I made these contour plates, and they were each worn for about ten years with much satisfaction to the patients. I have occasionally followed the practice of employing bridges as

anchorages or for the fixation of loose teeth. The largest bridge I ever made for a case of this kind involved some eight teeth remaining in the upper jaw, and extended from third molar to third molar. The anchorages were so complicated that I had to make two interlocking sections in order to introduce the bridge at all. It lasted about ten years, but ultimately became loose and had to be removed.

Dr. S. H. Guilford, Philadelphia: For the most part I believe the method of Dr. Ames is very good, but with Dr. Hoff I must object to the practice of devitalizing the pulps of firm teeth in order to brace up loose ones, because I think the result can be perfectly accomplished without it. I have tried all methods of ligating teeth, and have found that the best plan is to put narrow gold bands (the ordinary figure-eight bands) around the teeth. They should be as little conspicuous as possible, and be placed near the gum line but not extending beyond the enamel. Of course the best results would be obtained if we could pass them along the incisal edge, because the resistance would then be removed as far as possible from the fulcrum of the tooth, but that would be too noticeable. The bands can be fitted to each tooth very accurately, after which an impression is taken and the bands are soldered together and are held permanently in place with cement or gutta-percha. Dr. Hoff speaks about the desirability of each tooth having the natural tactile sense. That is all very well so long as they are reasonably firm in their sockets, but we do not have that function in bridgework, and where a number of artificial teeth are firm and virtually immovable they are comfortable. The natural teeth should be made comfortable if artificial appliances can be. Dr. Hoff also spoke of having the appliance removable, but I do not think it at all advisable. When teeth have become loose, whether from ordinary resorption or active pyorrhea, they probably are not going to last many years. After a splint has been put on we proceed to treat those teeth and to get them into as healthy a condition as possible, and I do not think any one would propose taking the appliance off and allowing the teeth to stand alone as they did before. They will need support so long as they are in the mouth, and this splint is intended to be kept on until they are lost. Whatever plan may be adopted for extending the usefulness of loose teeth, I think the appliance should be inconspicuous, should hold the teeth firmly, and should allow of the teeth and itself being kept clean.

Dr. J. D. Patterson, Kansas City, Mo.: I am surprised that so many of the speakers have opposed the destruction of pulps in teeth severely affected by pyorrhea. Those who have had considerable experience in the treatment of this disease desire the absence of the pulps of those teeth in every instance when the affection has progressed so far that an appliance of this kind is demanded. The tactile sense referred to does not come from the pulp and is not interfered with by destruction of same. While Dr. Ames' plan is somewhat complicated it has its good features. I fully agree with him that all methods of using ligatures for the retention of these loose teeth, except for very temporary purposes, are a delusion and a snare. From a considerable experience I would earnestly advise you not to depend upon any makeshift. We want an appliance which can be cemented on and which will hold each tooth immovable, so I invariably use a permanent splint, something the same as for a fractured jaw, cementing it on. Nothing is so important as an absolutely solid retention of these loose teeth in order to bring about their recovery, and you cannot do it with any form of ligatures. A splint with burnished gold back of the tooth and with silk ligatures attached is one of the vilest appliances that I have ever seen in the mouth. A method which I have employed with lower incisors recently has been permanent and satisfactory to both me and the patients. I make a metal model of the teeth to be retained and upon it swedge a band of gold to the lingual surfaces, then drill holes through the teeth, between the pulp and cutting edge, to receive a small gold wire, which is soldered to the plate at the proper point. The plate is then reenforced with a layer of solder, the rubber-dam put on, and the whole cemented firmly in place. The pins in the tooth are cut off even with the surface of it, so that no gold shows except the end of the little pin which is not visible eighteen inches away, and the splint is not unsightly. It is far from the gum, so that the tooth-brush will reach the interproximal spaces just as if no splint were present. We should never think of putting wires close to the gum, as some have recommended.

Dr. D. R. Stubblefield, Nashville, Tenn.: The essayist made himself very clear as to confining the application of this process to extreme cases, and did not refer to those which are remediable under different circumstances and with different appliances. He spoke only of those cases where desperate remedies are demanded

because desperate conditions are present. Consequently, the discussion should be confined to this class of cases and to the expediency of preserving the crowns of the natural teeth. It seems to me to be utterly impossible to preserve normal conditions where such a desperate state has been reached, so all we can do is to keep the parts in a more or less healthy condition, impressing upon the patients the fact that they must be their own doctors between their visits to us. I agree that the use of peroxid of hydrogen in the treatment of these mouths is wise practice, and I think altogether Dr. Ames' method is the best for these desperate cases. The destruction of the pulps is certainly expedient. The use of natural teeth was given up long ago, because they are subject to progressive, though perhaps slow decay, but often the patients desire the old teeth kept and in such cases we should do so.

Dr. Garrett Newkirk, Los Angeles, Cal.: Where applicable I have never seen anything better suggested than Dr. Ames' method. If the operator has proper manipulative ability it should be perfectly successful. It is eminently proper to destroy the pulps in these desperate cases of pyorrhea, and it often happens that when the pulps are removed success follows what seemed to be a hopeless case. I remember one instance several years ago which seemed to be utterly hopeless, but after removal of the pulps from the lower incisors the parts were restored to a healthy condition and have remained so until this day. Dr. Hoff thinks this is not conservative treatment, but it seems to me eminently conservative. I fully agree with the criticism that has been made upon those appliances which are fastened with ligatures. Of all things, deliver us from the vegetable fabric ligatures or thread, except for temporary uses. Wire is also a difficult thing to manage, is apt to be in the way, and seldom can be depended upon for any length of time.

Dr. Litch: I am no special advocate of ligatures, and the process which I mentioned occurred to me only as a possible alternative. I should never think of applying it where a permanent splint was required, for no one cares to continue tying ligatures indefinitely. I would criticise Dr. Guilford's statement that it is easy to make a series of perfect fitting rings passing over the cutting edges of the lower incisors near the gum line, for such is not my experience. There is such a divergence in the shape of the lower incisors at the cutting edge and at the gum line that anything which will fit the

one cannot possibly fit the other. Another trouble with a series of these rings soldered together and cemented on is that the cement is continually washing out. For an otherwise hopeless case I heartily approve of Dr. Ames' operation, and I have often secured considerable benefit from devitalization of the pulp, especially in matured teeth afflicted with pyorrhea.

Dr. E. A. Bogue, New York: I wish to express my appreciation of the method which Dr. Ames has set forth. I am surprised, however, that he should wish to match natural teeth, as nowadays I supposed gold crowns were the only things for front teeth, judging from what we see all about us. This question of the loss of tactile perception with bridges is worth careful consideration. My personal experience in the manufacture of such things is limited, but I have seen a good many which came from various eminent operators, and I believe they all break away from their attachments at all points save one. Why can we not adopt Dr. Wm. Davenport's plan of attaching these bridges at one point and letting them simply rest on the others? A woman patient recently remarked that she had left a well known dentist because his motto seemed to be, "In case of doubt, pull." We are indebted to Dr. Ames for the suggestion of another practicable means of avoiding that extremity, and if he shall succeed in devising a plan as efficient as this one, and at the same time more accessible to those of us who have not his manual dexterity, he will do us a still greater favor.

Dr. V. H. Jackson, New York: There is one very important feature of this subject which should be considered. Dr. Ames states that he replaces the roots of teeth that have become separated from their sockets because of calcareous deposits or pyorrhea. My experience has been that such teeth can never again become attached to their alveoli, and I referred to that subject some years ago before this Association. My idea would be to introduce the root of some other tooth that has not been thrown out because of these troubles, and that would not continue to irritate the tissues of the socket, but around which the tissues would become healthy and thus afford a support that would help maintain a bridge:

Dr. Ames, closing discussion: I wish to express my satisfaction at receiving so little adverse criticism. I expected much more, because this was presented as a radical measure. I was disappointed

when Dr. Hoff criticised this as unconservative treatment, at the same time speaking of cases in which the teeth are to be fixed for a short time and the appliance is to be taken off after they have been cured. I earnestly tried to show that I was not talking about that class of cases. Just in proportion to the desperateness of the case is some such operation called for. I presume that in the condition of which I speak Dr. Hoff would extract. I believe the fitting of so-called figure-of-eight gold bands, as described, is an imposition on the patient, and is on a plane with the "entire gold crown" dentistry of which Dr. Bogue speaks. When by destroying a pulp, amputating some teeth, and putting on an inconspicuous series of bands, you can rigidly fix teeth which at one time were so loose that the patient had no use of them whatever, I call the result conservative dentistry.

Probably my models gave the impression that I believe in extending such an appliance to the cuspids in most cases, but in actual practice this would be the exception, as in the normal arrangement of the teeth the laterals are so supported by their contact with the cuspids that only the four incisors need to be included in the splint. The apparatus spoken of by Dr. Litch I described as an inlay post anchorage, and I think it was illustrated by the model of the upper denture which has been passed around. I should not in any case depend upon ligating that appliance to the teeth, but would cement it in some way. I find gutta-percha most satisfactory, and often depend upon a very thick solution of it. The shrinkage in the hardening of such a mass is not detrimental, and the more I see of the results of gutta-percha attachments the more favorably I am disposed towards them. For some reason a loose attachment of gutta-percha is not accompanied by decay and softening as a loose attachment of oxyphosphate would be. Dr. Litch was mistaken in thinking that I made any reference to the salutary effect of bands. I argued only the salutary effect of mechanical fixation, which in the appliance advocated calls for the use of bands. In regard to what Dr. Jackson said about returning these roots to their sockets, I said I did not care whether there was an attachment or not. Probably there would not be, because in these cases there is no bone. We are simply putting the root back into a fleshy socket for the conformation and better general condition which it gives.

MALLET AS A SOURCE OF ENERGY.

BY CLAYTON H. STEARNS, D.D.S., OWATONNA, MINN. READ BEFORE THE NATIONAL DENTAL ASSOCIATION, AT MILWAUKEE, AUG. 6-9, 1901.

The mallet from a mechanical standpoint affords a simple solution of the problem of concentration and application of energy with which we are all familiar. Its use from long habit has become almost instinctive. One would never think of using a riveting hammer on a swage block, or a swaging hammer to head a rivet. It is only in peculiar situations that we find any difference in practice, one of these is in dentistry. Here mallets of many materials from steel to leather and in all weights from half an ounce to half a pound are in use, and each user thinks his the only one. Why is this? Is it not that from the nature of its use we cannot employ its full capacity, consequently its limitations are not forced upon us as in other ways, and that we have never taken the trouble to study its peculiarities?

We now propose to study these peculiarities and limitations and their causes. This carries us at once into the field of dynamics, and what appeared so simple a problem has become infinitely complex. How intricate and involved we can perhaps imagine when, as stated by Williamson, to determine the result of contact of two spheres, we have no less than thirteen unknown quantities, and thirteen equations expressed in terms of the calculus. He then intimates that the subject of impact is but little understood, having never been thoroughly investigated. Although the consideration of these questions opens up such a wide field, the principal laws that govern are comparatively simple and such as can be readily shown.

We have an apparatus familiar to every student of physics, although a modification of the usual form, as in this case the balls are of hardened steel. Lifting a ball at the end of the line and letting it fall, we notice that the life, motion, power, force, energy, call it what you will, seems to leave it so soon as it touches the next, and passing through the line enters the last ball, which swings off with the same energy the first had. As it falls back the action is repeated and we have the swing of a pendulum, divided equally between the two. Should we wish to increase the arc through which the second ball swings, the other remaining the same, we naturally increase the weight of the first and raise two balls, letting them fall together. As we have doubled the weight and the fall is the same, we have

doubled the energy and may expect the last one to rise twice the distance. Instead, two balls rise and only the same weight as before. Possibly the weight being divided has an influence. We now take a lead ball the same size and one and one-half times the weight, letting it fall as before, when the last ball rises only half so far as before and two others follow at unequal intervals, all moving. Lead is not elastic. We try an elastic one and obtain the least effect of any. All the balls swing a short distance together, except the first which recoils slightly.

These experiments are sufficient to indicate the difference in impulse of the various mallets in use, the first producing an impulse of high tension; the second double the impulse with the same tension; the third a heavy impulse of low tension; the last a slight impulse of very low tension. The volume of impulse is governed by the weight of the moving body, the tension by its velocity, measured in this case by the distance of its fall, varied in both respects by the ability of the material to transmit.

Find how these differences are produced. We may for this purpose divide materials used into two classes, elastic and inelastic, each varying from hard to soft. Of course we have all grades of variation in both respects, but to study we need consider only the extremes. First we take an elastic substance and for convenience a soft one; rubber meets both requirements. Upon knocking or pressing two balls together we notice they are compressed or flattened in proportion to the amount of force used, and that they exert a force in opposition or an expansion force equal to it, in other words, the compression stops only when these forces are equal. This being the case, it is obvious that in the impact of an elastic substance upon an unyielding one it will come to rest at the instant when these forces are equal.

It also follows that the first force will have all been expended the instant motion ceases, therefore only the force remains which tends to restore the original form, the expansive force, this we can measure by the rebound. The proportion which this expansive force bears to the first in effectiveness is termed the coefficient of restitution. It is never equal to unity, as a portion of energy is always lost in various ways. Given two equal bodies, one at rest, the other colliding with it, we again find the impact divided into two stages of compression and restoration. The second body being movable,

it is evident that as the first gives up energy by loss of motion, the second will acquire motion by its reception in a like degree; therefore at the instant of greatest compression both bodies will have the same velocity. The expansive force then coming into play, being equal to the first and acting on both bodies alike, must decrease the velocity of the first by an amount equal to that already given up; this being one-half, will reduce it to rest; the second being increased by a like amount will have the same velocity originally possessed by the first.

Regarding the difference in elastic bodies, between hard and soft with the same material opposed, it is apparently nominal, while in fact there is a wide one which becomes apparent so soon as we break up these couples. That difference is in the depth of compression or the amplitude of change in form, introducing the element of time, an important factor. It is self-evident that with the same initial force it will require a much longer time to pass through a wide amplitude of change in a soft substance than the narrow one of the hard, and it follows that the tension must be in inverse ratio to the time occupied in transmission. Thus, an impact transmitting ten units of energy in one unit of time will give a tension of we will say ten; while one transmitting the same energy in two units of time will give a tension of but five. If the work requires a tension of four we have in the first case three-fifths of the total used in work, and two-fifths to be taken up by outside resistance. In the second we have only one-fifth used in work and four-fifths in outside resistance, a difference of three times the amount available for work to one-half the outside resistance, equal to six times the amount of work to the same unit of resistance in favor of the quicker transmission.

With non-elastic material the first part of the impact is the same as before, compression takes place until the velocity of the two bodies is equal. There being no expansion the second part does not follow and the two bodies move as one. With a material so hard as to have no compressibility the tension of energy transmitted can therefore not possibly rise higher than one-half the initial tension.

With a soft material we have in addition to this to take into account the molecular tension, that is, the tension of force required to produce change of form. In this case such a proportion of the

initial energy will be lost in transmission as the molecular tension is less than the tension of energy as—a body moving with ten units of energy at a tension of ten, and with a molecular tension of four, will lose six units of energy in transmission, and the remaining four will be reduced in tension one-half, giving but four units of energy at a tension of two, showing that in the transmission of energy by impact the higher the coefficient of restitution and the molecular tension, the greater the amount of energy transmitted and the higher the tension.

Having considered the material, we will not consider the mass or weight of the moving body. For this we have the simple rule—the energy of moving bodies is directly as their mass and the square of their velocities. As a mass of one pound moving ten feet per second develops energy to the amount of one hundred foot-pounds, or a mass of one hundred pounds moving one foot per second develops one hundred foot-pounds. Although the figures are the same no one would think of the results of impact being the same, yet how shall we express that difference. In default of a better method we offer this: Let the mass express the volume of energy and the square of the velocity the tension. In the first case we would have one volume of energy at a tension of one hundred; in the next a volume of one hundred at a tension of one. Given an idea of their qualities and capabilities, we thus see that the greater the weight the greater the volume of energy transmitted irrespective of the velocity. Its working qualities, however, depend not on the volume but on the tension, and this is governed solely by the velocity.

We have an apparatus designed to illustrate this. It is built somewhat on the plan of the cross-bow which some of us were familiar with when younger. Instead of the bolt then used we employ two steel hammers, one of which weighs six times as much as the other. For resistance we employ blocks of soft pine resting on a plane surface. We judge the tension of the force with which the hammers strike by the distance to which they will drive nails in the blocks. We can also measure the entire force by placing resistance enough behind the blocks to take up all this force, and noting the distance to which the nail is driven. We measure the force applied to the hammer by the number of rubber bands used. By experiment we find that with the same number of bands the light hammer

will drive the nail much further than the heavy one where no resistance is placed behind the blocks; on the contrary, with full resistance the heavy hammer will drive the nail much further. We also find that to get the same effect from the heavy hammer that we did from the light one without extra resistance, we must increase the number of bands in proportion to the weight of the hammer, thus giving it the same velocity; but in doing this we have increased the total energy in proportion, showing that to raise the tension without increasing the energy we must decrease the weight and increase the velocity, and vice versa.

To apply the foregoing to the mallet as used in dentistry we must regard the resistance as fixed, as we can avail ourselves of only a certain amount. If we exceed this pain and injury is caused and we must also remember that in the application of the energy we have a second impact subject to all the laws of the first. The application of energy is outside the limits of this paper, but the two subjects are so inseparably connected that it is impossible to consider one and not the other. This second impact is a peculiar one, in that we start with an inelastic material with very little molecular tension. This rapidly changes and we find the tension and elasticity rapidly increase.

What do we wish the mallet to do? (Remember we have a fixed resistance.) Place and condense large masses of non-cohesive gold? Then it must supply a large volume of energy at low tension; or to make cohesive gold as hard and dense as possible it must supply energy in small volume but very high tension, as it requires tension to produce tension. To supply the large volume and low tension of energy of the first case we must select a very heavy mallet of a soft inelastic material. To supply the high tension and small volume of the second we must have a very light one of the hardest and most elastic material.

In introducing a large filling, to obtain the best results, considering the comfort of the patient, the rapidity with which the work can be done, and the quality when finished, we should therefore use at least three different mallets. First, for the the introduction of non-cohesive gold, a seven ounce lead or leather-faced one, as what we want here is a swaging blow that will penetrate the whole mass, the heavy blow of this mallet approximating more nearly hand pressure than any other, yet giving increased power. In building up

the body of the filling, a one and a half or two ounce steel mallet, as what we want here is not to produce hardness in the gold but strength. *Cohesion.* This part may be compared to laying a brick wall, and what we want is not, as in the first case, a force that will penetrate and condense the whole mass—that is impossible, we haven't the necessary resistance—but one that will simply force the last brick into position and perfect union with the rest without raising the molecular tension higher than is necessary to produce this union. In finishing contact points, occlusal surfaces, etc., we should use a hardened steel mallet weighing one-half ounce or less, as by its use we can harden the surface until it will ring like steel, this difference showing at once in polishing.

In conclusion we will say only that we believe any one who works along these lines will be inclined to reduce rather than to increase the weights given.

Discussion. *Dr. James Truman, Philadelphia:* Probably all of you know that the history of the mallet goes back to an early period in the last century. Koecker, in writing about the mallet in 1826, called it the most destructive agent that could be used, and in 1835 Fitch equally condemned it, and he also deprecated the use of the drill moved by a bow. Thirty years ago I spent considerable time in experimenting with the mallet and looking up the laws which governed it, because in those days mallet force was seemingly not comprehended and its laws were not properly applied. Many dentists used the eight ounce lead mallet and few employed the small steel one. Dr. Stearns has now demonstrated, as I did at that time, that the half-ounce steel mallet is better for the purpose of overcoming the mobility of the patient's body, because greater velocity is obtained, with greater density in the mallet. This depends upon the third law of Newton—that action and reaction are equal and opposite. When a heavy lead mallet is used on a gold filling the force of the mallet is distributed throughout the individual, and at the point of impact the energy applied is lost to a great extent. Although Dr. Stearns is theoretically correct, I do not agree with his assertion that he can use a six or eight ounce lead mallet on soft gold. I demonstrated years ago that the mallet force becomes destructive if used beyond a certain limit, and that limit is passed when the heavy lead mallet is used on soft gold. A thorough condensation is needed in our work, and we must have velocity if we

are going to effect condensation at point of impact. Velocity and not weight overcome mobility in the patient. When experimenting years ago, in order to prove the propositions that I thought were correct, I made fillings of tin, cohesive gold, soft gold, etc., in steel matrices, using a great variety of mallets. The finished fillings were then weighed at the U. S. Mint. Perhaps it would have been better to have obtained the specific gravity, but the weight was accurate enough for all practical purposes. I employed various bases, and had, for instance, a soft cushion that I used to represent mobility. Placing the steel matrix upon this, I used various mallets to demonstrate that the force of the blow was distributed throughout the body, and that action and reaction, according to the law of Newton, were not equal in this case. In other words, the coefficient of restitution was low. Then other bases of varying degrees of hardness were taken, and it was demonstrated that the filling packed by hand pressure on a hard base, such as a table, was equal to that packed by mallet force. It was shown that a half-ounce steel hammer on a wood base gave $236\frac{1}{2}$ milligrams in weight, while hand pressure on the same base gave $231\frac{1}{2}$ —a trifling difference. It was further demonstrated that the half-ounce steel hammer on a wood base, and the eight ounce lead hammer on a steel base, gave practically the same result in weight by milligrams. In demonstrating the effect of velocity over mobility, I was brought naturally to the then newly invented electric mallet. This, giving from five hundred to one thousand blows per minute, necessarily overcomes mobility upon any base to which it may be applied, as was proven by the fact that it would pack gold on a soft cushion with the same certainty and the same condensing force as it did on a hard base, and the two fillings were equal within one or two milligrams. At the present time there is no difference between the electric mallet, the mechanical mallet, and all mallets that are used with power in the condensation of gold fillings. I am pleased to see some one taking up this work, and I trust Dr. Stearns will go further with it. I think that if he will make his experiments so that the whole profession can understand the results without so much theory it will increase the general comprehension of what the mallet should be.

Dr. Stearns, closing discussion: The practical side of this question has been gone over so thoroughly by Dr. Truman and others

that I did not think it necessary to touch upon it. In other lines, where mechanics use the hammer, the matter is thoroughly understood. For instance, when the engineer wishes to key up the boxes of his engine he does not take a light steel hammer, but a heavy copper or hide-faced one, because he wishes a tool that will drive the key home and not bruise it. He needs and obtains in this way what we term a swedging blow. A light steel hammer would batter the key all to pieces and still not drive it home. In driving a tent-pin into the ground an ordinary hammer will split it all to pieces, but a heavy maul or axe will bury the pin in the ground without bruising it. Piles are driven with a heavy hammer and short fall, because a light hammer, carried to the height necessary to give sufficient energy to drive the pile, would batter without moving it. There is nothing new in my paper except the differentiation between the qualities of the blow, using the terms "tension" and "volume." The best books and most able writers on this subject make no reference to this distinction, but it is one with which we are all familiar. I shall have to differ with Dr. Truman as regards the use of a heavy mallet for soft gold. What we wish there is a swedging blow, and we do not want to increase the tension. We need something that will penetrate the entire mass and weld it together just the same as we swedge plates. The only difference is, that when using soft gold we have a large number of very thin plates, while when swedging a base for a set of teeth we have only one plate. The action is exactly the same, but in packing cohesive gold it is different. There is no need of discussing further the practical side of the subject, because there is no end to it. If each one will simply stop and think of the use of the hammer in other lines he will have the whole subject at his fingers' ends.

PHYSIOLOGY, ETIOLOGY, HYGIENE, PROPHYLAXIS AND ELECTRICITY. REPORT OF SECTION IV., NATIONAL DENTAL ASSOCIATION.

BY J. D. PATTERSON, D.D.S., KANSAS CITY, MO., CHAIRMAN OF THE SECTION. READ BEFORE THE ASSOCIATION, AT MILWAUKEE, AUG. 6-9, 1901.

In noting late investigations and observations in the subjects of this section we naturally turn first to the consideration of caries of the teeth, that universally prevalent disease which introduces the greatest number of dental disorders, and inquire if there is addi-

tional light upon its etiology. After the researches of Prof. Willoughby and Dr. Miller, whose conclusions have been most universally accepted, the discovery of the "gelatinous plaques" by Black and Williams engrossed the attention of those interested in the etiology of caries. These plaques have been discussed at length in dental literature, and the place claimed for them as factors in dental caries is well understood, so in this report we shall look for more recently promulgated knowledge about caries. One of the most important articles on this subject was brought forward at the recent International Congress at Paris, where an author of renown, Dr. Michaels of Paris, in making a report upon an extensive study of the saliva, claimed "That the saliva like all recrementitious secretions is liable to physiological oscillation in constant relation to the changes in the humors of the body." Connecting this study with caries of the teeth, these conclusions with others are reached: 1. "The saliva contains definite chemical principles which arrest or retard the progress of dental caries (sulfocyanid of ammonia)." 2. "The alkaline sulfocyanids arrest the formation of putrefactive fermentation." 3. "Chemically dental caries is a disease of demineralization, due to the presence of an excess of acid principles in the saliva having a greater chemical affinity for the constituents of the tooth." 4. "The chemical affinity of potassium and sodium is greater than that of the earthy alkaline bases in combination with acid salts." 5. "Lactic acid possesses a greater affinity for calcium than does carbonic acid." 6. "Active dental caries characterizes the hyperacid diathesis." 7. "Diathetic dental caries (gout and diabetes) results from lactic acid fermentations."

In 1900 Dr. Michaels said upon the same subject: "My investigations of saliva compel me to recognize other causes than microorganisms for dental caries. The chemical influence of the saliva is undeniable, as can be proved by any physiologist or chemist who will respect my observations. The objections of certain authors, who deny that saliva contains acid enough to produce appreciable effects, seems to me to rest either upon experimental errors or upon lack of reflection. Various medicines introduced into the body reappear in the saliva—iodids, for instance, occur as alkaline iodids, bromids act similarly, mercury also, in short, one may justly conclude that active glands absorb, secrete and excrete other things than their normal products. No matter how feeble the dissolved

chemical element may be, if it have affinity for a base there is a reaction. These reactions may be more manifest or less, that is merely a question of the proportions present and the length of contact." In discussion of Dr. Michael's paper Dr. Leon Frey said: "The study of the chemistry of the saliva is an entirely new thing and has begun now just as the study of the blood, urine, etc., began years ago. * * * The physician studies the urine. Now the dentist will study the saliva and they will both see the relation between the different phenomena."

At the same session of the Congress Dr. Frey said: "The question of the etiology of dental caries, after having been considered solved, has again become the subject of important discussions. This discussion began on account of the contradictory views of Galippe on the one side and of Black and Williams on the other." Dr. Frey tabulated the etiology of dental caries as follows: 1. General Predisposing Causes. 2. Local Predisposing Causes. 3. Occasional Predisposing Causes. 4. Efficient Predisposing Causes.

In this tabulation a number of microbes are given as causing caries. In discussion Dr. Chouet, who is a well known investigator on the subject, stated: "*I am totally convinced that specific microbes of dental caries do not exist*, and the reason is because the beginning of dental caries consists in the decalcification of the enamel." Continuing, he said repeatedly and emphatically: "*This disorder (caries) can be produced by any of the ordinary mouth microorganisms.*" Concluding, he said: "I am convinced, and next year I expect to be able to scientifically demonstrate, that *dental caries can be produced by any common species of microorganisms.*" These statements will be of exceeding interest to many teachers who have labored to inculcate into the minds of their students the idea that a specific microorganism must precede tooth caries.

It must be said, however, that while Dr. Miller was no doubt largely instrumental in giving out the theory of a specific microorganism for caries in earlier investigations, in his later writing he admits having observed four varieties of microbes either of which may be responsible. The positive and sweeping statement of Chouet, however, that any sort of a microbe will produce caries, is certainly an advanced belief, and on account of his prominence commands our attention. Opposing this statement of Dr. Chouet is

the recent enunciation of another prominent author, Kenneth W. Goadby of London, who says: "We must in the first place guard against the supposition advanced by some, that all organisms are capable of acid production under favorable conditions."

A recent notable article by Dr. Miller deals with the claims of Dr. Palmer and others, that recurrent caries is due to electrical currents, satisfactorily proving that recurrent caries originates just as the primary form does.

Prominent in importance (while under the head of etiology) must come a consideration of hygienic measures for prevention of caries, therefore another subject of this section, *Hygiene*, will engage brief attention. In an article by Dr. M. H. Fletcher of Cincinnati, entitled "Alkaline Saliva," he claims that if the saliva were continuously alkaline, as in normal conditions, caries would be prevented. That an alkaline fluid is therefore needed at the "portal" of the body for protection; and thus, if saliva is kept alkaline in excess of normal, many of the acid-forming fermentative and putrefactive processes are prevented in the mouth; and that saliva being swallowed in this purer state assists digestion instead of interfering with it. Dr. Fletcher gives the following powder which he claims will meet the conditions and be preventive of tooth caries—Pulverized Cereal, 75 per cent; Sodium Borate, 17½ per cent; Potassium Chlorate, 7½ per cent; Orris and Menthol for flavor, Sugar to sweeten. Dr. Fletcher claims that five grains of the powder are sufficient to keep the saliva alkaline for some time after using. The pulverized cereal is used instead of chalk, pumice, or cuttlefish bone, as the abrasive quality which is contained in most powders, and which is injurious, is thus lessened. These claims are placed before the National Dental Association for consideration, for if well founded they are surely valuable in the prevention of dental disease.

In an article by Dr. G. V. I. Brown of Milwaukee on Prophylaxis (DENTAL DIGEST) he calls attention to the superficial character of mouth sterilization in the following words: "Based upon a series of experiments testing the efficacy as a mouth-wash of hydrogen dioxid (Oakland), as compared with a 5 per cent solution of carbolic acid and a one in two thousand solution of bichlorid of mercury, I have to offer the following conclusions—Carbolic acid and bichlorid solutions held in the mouth come into contact with only those germs that are superficially located, and destroy them.

When a deeper scraping is taken a growth is easily attained, therefore sterilization is incomplete. When hydrogen dioxid is used it oxidizes the organic deposits about the teeth, loosens up the secretions about the gums, and sets free germs that were at first inaccessible to the action of the carbolic acid and bichlorid solutions. If after the germs have been thus set free carbolic acid or bichlorid solution or further quantities of hydrogen dioxid be used, the most desirable state of asepsis is obtained."

An article in the *British Dental Journal* by Dr. J. Douglas Logan, Edinburg, contains the following: "Having thus far discussed the matter of caries in relation to health, and the condition of the oral cavity generally in relation to the dental organs, we may now ask wherein lies the cause of this appalling destruction of teeth, and verily, the answer is not difficult to find. The question must be entirely one of hygiene—what has been done with so much success in the treatment of zymotic diseases, namely, perfect sanitation, free access of pure atmospheric air and careful dieting, or, in other words, an improved condition of the surroundings of the patient, is precisely what is required in regard to the teeth if they are to be maintained in a satisfactory state of health." Dr. Logan almost entirely ignores predisposition and constitutional dyscrasia as factors in caries of the teeth.

At the Paris Congress Dr. Ernest Jessen of Strasburg read a paper upon "Instruction of the Public in Regard to the Value of Dental Treatment in Relation to General Health," in which he used these pregnant words: "It is evident, and we can never repeat it too often, that this enormous propagation of caries of the teeth in all classes of people ruins the health of the individual and constitutes a great danger to the general health. * * * From the mouth these microorganisms can penetrate to the interior of the cranium, into the salivary glands, lungs, and even into the general circulation. Even in the mouth accumulations of bacteria often cause inflammations which can become serious. Miller says that as much attention should be paid to the mouth in cases of digestive trouble as to the diseased stomach. Want of appetite, bad taste in the mouth, and especially fetor of breath, that are supposed to originate in the stomach, are caused only by a neglected and unclean condition of the mouth. These statements prove to us that the masses of bacteria found in unclean mouths, independent of those

introduced with the food and beverages, are sufficient to provoke fermentations and chronic dyspepsia of the stomach. * * * Bacteria of diphtheria have been discovered in the mouth of a healthy child. The bacteria are only waiting for certain favorable conditions in order to produce their specific effect. Even the agent of pneumonia is found very often in the saliva of healthy people. The infections caused by bacteria from the atmosphere or from contact with infected objects are favored by the unhygienic condition of the mouth. In consequence, one of the most important preservative measures during an epidemic consists of giving to the mouth the kind of care required by the particular case." Dr. Jessen in concluding strenuously argued that dentistry should be a factor in popular and public hygiene.

The attention of this Association is respectfully called to the advocacy of inspection by dentists of the mouths of children at public schools, which in the discussion of Dr. Jessen's paper was advised especially by Dr. Bonnard of Paris. Dr. Bonnard thought this inspection should be made four times a year. Is not such a move possible in America, and is it not superior to the often advocated method of lectures to teachers and pupils in our schools?

Upon the subject of the "Etiology of Adenoids," J. Wright, M.D., recently had a valuable article in the *Brooklyn Medical Journal*. Of interest from a dental standpoint are the following conclusions: "This brings me to the etiology, which perhaps is more open to discussion than any other part of this much-discussed subject, and that is, the relation of the shape of the upper jaw to the presence of the lymphoid tissue in the pharyngeal vault. A number of years ago it was universally acknowledged that a jaw presenting a high buccal arch was usually, if not always, the result of post-nasal obstruction. This I have always believed to be erroneous. No one has ever been able to explain satisfactorily the rationale of it; it is certainly not, as some have said, by the rarefaction of the pharyngeal air. That of course takes place on inspiration, but it takes place below the adenoids and should produce scoliosis of the vertebræ or collapse of the oropharynx and trachea. The open mouth, the lower jaw dragging on the sheath muscles, has been said to approximate the alveolar arches by pulling them down and so inward, as would elastic bands. Neither clinical observation nor anatomical facts bear out any such theory, plausible though it seems."

An extremely interesting article by E. B. Dench, M.D., *Cosmos*, November, 1900, upon "Reflex Aural Symptoms Dependent upon Dental Caries," is recommended for careful reading. The closing words to his medical confreres are as follows: "I wish again to emphasize the importance of a thorough examination of the teeth, not only in all cases of otalgia not due to acute inflammatory conditions in the external or middle ear, but also in cases of tinnitus aurium, or of progressive impairment of audition in which the pathological factor is obscure."

"Diseases of the Eye in Relation to Diseases of the Teeth," by E. W. Stevens, M.D., Denver, is another recent able article showing how many diseases of the teeth affect the visual organs. The author strenuously advocates examination of the teeth by an expert dentist in all cases of painful or inflammatory conditions of the eye.

Dr. Leon Frey of Paris read a paper before the International Dental Congress, 1900, upon "Chemical Erosion of the Teeth." In regard to its etiology he said: "The question is still in obscurity." Among the predisposing causes he thinks arthritism is of capital importance.

Every member of the profession must be interested in the etiology of sensitive dentin, that bugbear of the operator in nearly every day of his practice. Dr. A. Gysi of Zurich read a paper at the International Congress upon this subject. His theory of its cause is as follows: "Probably you know the physical phenomenon of the incompressibility of water or of substances rich in water. If pressure is applied against one end of a tube which is filled with water the pressure is directly transmitted to the other end. The dentin is traversed by a great number of canaliculi, which are filled with a substance or protoplasm which serves for the nutrition of dentin, and is very rich in water (about 80 per cent), and which behaves like pure water and is incompressible. When pressure is exercised in a carious cavity with an instrument the pressure is directly transmitted through the semi-liquid contents to the odontoblasts, which are the center of the true sensitiveness of the dentin."

Etiology of Pyorrhea Alveolaris. Since the uric acid diathesis was by a few investigators declared to be the causation of the disease known as pyorrhea, there have been other and later hypotheses of its etiology. The one that seems at present to be gaining in popularity is, that the disease is caused by a specific microorganism, and

when this is isolated and an agent for its destruction found, cures will be effected and not before. For those who are so prone to magnify pyorrhea into a specific trouble we do not invite sympathy, but instead ask all to follow the clearly laid down and simple effects of local irritation and environment, accentuated by the malnutrition found in many constitutional conditions.

Those who are concerned about the microbic cause of pyorrhea have recently the following sage advice from Dr. Williams—"The tendency with the pathologist, who is chiefly concerned to find a specific cause for his disease, to regard every separate form of microorganism which appears constant under a single method of cultivation as a distinct species, is perhaps quite natural, but there is not room enough for the truth in any theory which is not large enough to contain all the facts. The problem of the pleomorphism of fungi is intimately associated with their methods of reproduction."

We respectfully direct the attention of those who without any proof claim a microbic origin of this disease to the difficulties surrounding the isolation and proving of a particular microorganism as a cause of inflammatory conditions in the oral mucous membrane. Those who trippingly say that pyorrhea is no doubt due to a specific microbe will cause the life-long investigators in the biology of bacteria to smile at the ignorance and credulity of those who unthinkingly make and second the statement. Experiments so far are negative. They will doubtless so remain.

Dr. G. Lenox Curtis of New York, in an article entitled, "Syphilitic Loculosis Alveolaris" (pyorrhea alveolaris), claims that real pyorrhea is always caused by syphilis. With true bohemianism he volunteers the statement that "Only recurring cases are worthy of the appellation—Pyorrhea Alveolaris." Further he says: "So confident do I feel that my views are correct that I now treat all cases of this kind with antisyphilitic remedies, and I find that a large percentage of them are benefitted. In several cases I have been misled and diagnosed suppurative gingivitis as pyorrhea alveolaris. This I did because I could not find the egg-skin eschar, etc." By the way, this "eggskin eschar" apparently (?) discovered by Dr. Curtis is claimed as distinctly diagnostic and the reader is led to believe that if there is no "eggskin eschar" there can be no syphilis. Verily, a new syphilographer has appeared on the hor-

izon. One more quotation: "In 1890 I had an opportunity to study blood, and then it was that I became convinced that the usual method of physiological study of this pabulum was inadequate. I now believe the blood carries with it the active principles of most if not all diseases." Dr. Curtis will do well if he heeds a reminder of famous pathologists, namely, that "Both syphilis and other bodily taints can never be ignored in the treatment of nearly all diseases incident to middle or later life." The same is true of the uric acid diathesis, but to claim that all cases of pyorrhea are caused by either the syphilitic taint, the presence of uric acid, or a particular and specific microbe, is an astonishing statement to the pathologist and to the great majority of laymen in the field of etiology and pathology.

In an article by Rickman Godlee, M. S. Eng., the author directs attention to some of the surgical complications of pyorrhea alveolaris and cites cases which had been diagnosed as—"Pleurisy, followed by empyema;" "Pleurisy, followed by bronchitis, symptoms of carcinoma of stomach, and mercurial salivation." Upon treatment for pyorrhea which was found present every symptom of empyema, pleurisy, carcinoma of stomach, and salivation disappeared without other than local treatment. Dr. Godlee concludes his article as follows: "Some hold that pyorrhea depends upon the presence of some special microorganism, but the accuracy of this statement has not yet been established, and considering the large number and great variety of organisms always present in the mouth, it may be assumed that the proposition will be a difficult one to prove. It need not be added that when the pockets are once formed their contents teem with many kinds of bacteria."

Mr. Henry Sewill of England recently says in *British Dental Journal*: "In a large number of cases of pyorrhea there is a singular absence of caries, and the teeth are often of the best structural character. It occurs in many instances in patients whose care of the teeth amounts to fastidiousness. The malady is extremely chronic, many months elapsing before each affected tooth is shed. The disease starts in one or two teeth and gradually affects others not necessarily adjacent, until in the end the whole set becomes involved. Of the etiology of pyorrhea virtually nothing is known. It is always attended by or associated with disturbances of the general health, and to this dental disease beyond all others it would be

most reasonable to ascribe the systemic effect leading to the form of anemia so graphically described by Dr. Hunter."

Let us devote a few minutes to the consideration of the term so frequently heard of late, namely, "True pyorrhea," a term, by the way, we think "Cut to suit the imagination but not the fact." A term indicative of a condition of inflammation and phagadema in the oral tissues where the operator failed to effect benefit or cure on account of lack of skill, or because tissue destruction had progressed beyond hope of saving even by the highest skill the dental organs thereto attached, and so for convenience it was called "True pyorrhea." To our mind it is begging the question and is an excuse for the limitations of the operator either in knowledge or skill. If there can with scientific accuracy be a condition of true pyorrhea, there should naturally be a false pyorrhea; logically both names are anachronous. As well might the course of infectious disease at its advanced and fatal stages be called true pyemia, but in the earlier and curable stages be given another name. Pyorrhea has an infinite variety of changes from inception to the exfoliation of the teeth, but to denominate the incurable stages as only pyorrhea and arising from a different source *per se* than the earlier stages, is a sort of pathology and etiology unscientific and misleading.

Dr. B. F. Arrington of Goldsboro, N. C., recently says upon this point: "There is but one form of the disease, but there are sundry features that present as the disease progresses. I speak positively and pointedly upon this subject, for such are my convictions, established through practice and watchful observation, and I feel assured that investigation and time will confirm the verity of my assertions. All classes and grades of society are subject to it, and it seems to be on the increase. * * * It is not dependent upon any particular state of the system for origin, for all alike, the robust and the feeble, seem to be equally subject to it; nor is it a consequence of any other disease. It is always perceptible first at the margin of the gums, develops more and more plainly, with diagnostic features, and progresses (let the general state of the system be what it may) stage by stage, with features never varying, developing until it stops with destruction of the alveolar process and loss of the teeth."

Dr. Barrett, in his late edition of "Oral Pathology and Practice," again promulgates what we consider a positive misconception of pyorrhea in its various stages. On p. 144 he says: "True pyor-

rhea should be a specific, pathologic condition. The term itself, while expressive of our present knowledge, is too broad, covering altogether too much, for there are many exudations of pus from the alveolar walls that are easily explainable and of very simple origin. But until its exact nature is distinctly marked out and all its phenomena comprehended we must recognize at least three separate pathological degenerations that are covered by the term and which without doubt are often confounded with each other."

In this quotation Dr. Barrett seems so overanxious about making out three kinds of pyorrhea that he starts out by imploring his readers to believe that "*True pyorrhea should be a manifestation of some distinct specific pathologic condition.*" The words indicate that the author speaks without proof and without positive belief. Now let us for a moment inquire why "we must recognize three separate pathologic degenerations" in pyorrhea alveolaris. So far as the etymology and plain meaning of the name are concerned they do not ask us to do so. The name simply signifies—*A flow of pus from the alveolar region*—a condition, if you please, not necessarily specific. As Dr. Arrington says, it has its inception, "develops more and more plainly, with diagnostic features, and progresses stage by stage, developing until it stops with destruction of the alveolar process and loss of the teeth." Again, the so-called three kinds of pyorrhea all yield *positively* to the same treatment if sufficient unaffected normal tissue remains, namely, *surgical removal of every local irritant and the establishment of an absolute hygienic condition.* We respectfully submit then, that in the consideration of this disease misleading terms and divisions should not be taught in text-books.

Discussion. *Dr. C. N. Peirce*, Philadelphia: From some of the quotations in the report we are led to believe that dental caries is due to microorganisms in the secretions. It has not as yet been settled just what part is played by germs, and while there is no doubt that they exist in the mouth at all times, they do not always have an affect on the teeth. We must therefore believe that there are predisposing causes which enable them to make inroads upon the hard tissues. It is doubtless true that the enamel is first affected, but no one has ever attempted to explain how that takes place, except to say that it is through decalcification. This is simply taking out the lime and leaving the organic matter. Then the

inroads are made upon the tubular tissue of the teeth, and there we have the action of the microorganisms which not only decalcify the tooth but also disorganize the organic matter, and in that disorganization we have decay. We can place a tooth in an acid solution and decalcify it thoroughly and yet have no decay, so the germs evidently play a part in disorganization of the organic matter.

Attention should be called to a fact which you all know, namely, that decay occurs most readily between the ages of seven and twenty. During that period the inorganic matter of the system is being employed in building up the hard tissues, so there is not the surplus which there is in later years to counteract the acidity which we may have in the mouth. Every dentist knows that the progress of decay is coincident with the formation of the hard tissues, and that it is largely retarded after they are fully formed, so age has much to do with the progress of decay. After the tissues are formed we have a deposit of tartar or hard salivary calculus in the mouth, which rarely comes in early life, and when it is present in any considerable degree the progress of decay is much modified. It may occur between the teeth and in places where the brush and antiseptic cannot reach, but not to the same extent as before, so I state positively that the absence or presence of salivary calculus is an important factor in determining whether decay is progressing rapidly or slowly. I believe every one should use an antiseptic mouth wash, one that is anti-acid and that will correct the formation of acids in the mouth arising from whatever condition.

Concerning pyorrhea, you all know that the term used is simply the name of a symptom, for pyorrhea indicates merely that we have pus in the alveolar socket. Now, I understand from Dr. Patterson's statement that he believes it to be quite inconsistent with truth to speak of true and false pyorrhea. I have used these terms repeatedly, because they are the best I could think of to distinguish between one condition due to local and one to constitutional symptoms—the first cured by local treatment and the second by constitutional. The former condition may be present constantly. Every dentist at times finds pus in the alveolar socket which is occasioned by local irritation, and which can be cured by topical application, so I should not call it true pyorrhea. This latter is a form of disease

that cannot be cured by local application, requiring systemic treatment as well. I have always had a number of cases of pyorrhea under my charge, where the patients for years relied entirely upon diet and systemic treatment for the modification of the disease, and they have all been benefited thereby. Dr. Patterson is mistaken when he states that pyorrhea commences wholly at the gingival border, for the disease may have existed for months or years before we see that local manifestation and the appearance of pus. The trouble has been progressing from the apex of the root, where it most often starts. I know cases where this disorder has been in a family for three generations. Years ago, before I thought it possible to do anything for the disease, an elderly man came to me. I examined his mouth and predicted that he would lose all his teeth within a year, which proved true. His son afterwards came into my hands with a splendid set of teeth. I noticed a tendency to congestion in the periosteum of the root, which I modified by local and constitutional treatment. On one occasion, however, I found a small cavity between the molars, which was inaccessible without wedging, but so soon as the wedge was put between the teeth I discovered pyorrhea of the worst type around both molars, so I removed the wedge and filled the tooth. Constitutional treatment caused the pyorrhea to subside, and the patient now has not only those molars but has never lost a tooth, yet I can induce pyorrhea in any one of his teeth by the slightest irritation at the root. This is constitutional pyorrhea, because of his systemic condition, and if that condition were not present the disorder could not be brought on. That is true pyorrhea, and true pyorrhea is only constitutional and can be cured by nothing but constitutional treatment.

Dr. W. C. Barrett, Buffalo: The point concerning the influence of microorganisms especially engages my attention. This was the problem of the ages until Dr. Miller solved it. I believe he thought at the outset that none but acid-producing organisms would induce caries, but my impression is that he has modified his views and now believes that a much wider class of germs can produce it. That is, that under certain conditions a nonpathogenic organism may become pathogenic; that the character of a germ may materially change through its developmental progress and the influence of the media in which it is proliferated. If such is the case it broadens the field of influence of microorganisms in dental caries.

It is the reproach of dentistry that the disease which causes the most trouble is the least understood. Many men offer theories, but few prove them, and of the many hypotheses advanced not one has been absolutely demonstrated. We do know one thing, that pyorrhea is a disease of the pericementum, but we have not completely solved the question of its true etiology. We also know that it is a degenerative disturbance undoubtedly due to some metabolic changes that occur locally or in the general condition. If the disease consists of a general pathologic disturbance we have one series of symptoms which have been called true pyorrhea. As the essayist stated, that term assumes that there is such a thing as false pyorrhea, but we must make a distinction in some way. It seems indisputable that there are certain general changes which induce one line of symptoms, and there are changes restricted to tissues or organs which produce another line. I will stop talking, because I doubt if any discussion on general grounds teaches us very much about this mysterious disease.

Dr. E. S. Talbot, Chicago: I am much surprised at this late day to hear pyorrhea alveolaris spoken of as a disease entity and not a stage of infection. Disease of the gums and alveolar process is frequently of years standing, and yet no pus is noticed in the mouth. Indeed, a person may lose the entire set of teeth without the appearance of pus. Inflammatory conditions of the alveolus may exist without pus infection. This inflammatory process may be deep-seated or local, so I have substituted the term "Interstitial gingivitis." In this a local cause may produce the gingivitis which extends into the alveolar process. In the constitutional form of the disease it becomes interstitial in character, that is, deep-seated, and the alveolar process may or may not be involved. The inflammation which results from moving teeth in correcting irregularities, and the absorption of the alveolar process after a tooth has been extracted, should not be spoken of as pyorrhea alveolaris—the inflammatory process is deep-seated and interstitial in character. Any irritation will produce gingivitis, which invariably becomes interstitial, and no one can say where one leaves off and the other begins. Dr. Barrett does not believe it possible for anyone to detect experimentally the operation of constitutional causes, but I do. I subjected several healthy young dogs to mercury in different methods, and in a week or two they

were killed. An examination of the arteries in the alveolar process and the peridental membrane was made under the microscope, and the inflammatory process just beginning, as the result of mercurial poisoning, was clearly evident. There are many causes of this disease. Any systemic condition will produce the interstitial variety if the eliminating organs of the body are not in good condition. The most marked effects of the disorder are noticed in the soldiers in the Philippines, for after they have been there about two years the teeth of many of them loosen and drop out. On the other hand, men working 6500 meters above the level of the sea in a cold climate suffer with the same disease. In both cases it is nothing but interstitial gingivitis which eventually becomes pyorrhea alveolaris. As a result of these extremes of temperature the eliminating organs do not do their work. In the hot climate, while the soldiers do perspire, insensible perspiration is checked, the kidneys become clogged up, respiration is interfered with and autointoxication occurs. In the high cold climate the lungs are interfered with, the skin contracts, perspiration does not take place, so the kidneys undertake the work of the skin and lungs with the same result. In scurvy and in mercurial poisoning there is also autointoxication, and the gums and breath of a man suffering from Bright's disease indicate how far it has progressed. Autointoxication is merely self-poisoning. The blood becomes poisoned, irritation of the inner alveolar capillaries starts up, and an obliteration of the arteries of the alveolar process results. Interstitial gingivitis is due to autointoxication, and it makes no difference what the cause is. It may be due to typhoid, pregnancy, in fact, any condition which interferes with the work of the eliminating organs produces irritation and contraction of the capillaries and inflammation long before pus infection occurs. If the mouth be perfectly healthy pus infection will not take place, but if the mouth be not healthy the pus germs present affect the tissues, abscesses form and pus flows to the surface. There is only one kind of pyorrhea and one type of pus. In cases where a deposit occurs upon the roots of the teeth it is caused by a stasis of the blood due to obliteration of the arteries of the alveolar process. Absorption is going on and the deposit which results is nothing more nor less than the absorbed alveolar process which is deposited on the necks of the teeth.

BLEACHING ENAMEL.

BY JOSEPH HEAD, M.D., D.D.S., PHILADELPHIA READ BEFORE THE NATIONAL DENTAL ASSOCIATION, AT MILWAUKEE, AUG. 6-9, 1901.

The problem of bleaching stains from the substance of enamel has long been of vital interest to the dental profession, for when the decomposed pulp has been removed from a tooth-canal, and the dentinal tubules have been cleansed by peroxid of hydrogen or some other bleaching agent, only too frequently absolute success has been prevented by the fact that the enamel also has been stained.

Internal application or medicaments containing peroxid of hydrogen in these instances might partially affect the enamel in the region of the cervical margin, as at that point a body of dentin is found in sufficient quantity to act as a vehicle for an effective amount of bleaching fluid, but as the cutting edge is approached the dentin gradually disappears, leaving that portion of the enamel without adequate avenues for the application of any bleaching fluid from within. This is a serious objection to any method that depends solely on its ability to bleach through the dentinal tubules, as that portion of the tooth adjacent to the cutting edge is largely composed of enamel, and any process that fails to bleach this stained enamel is of doubtful utility.

The method which I now present has enabled me to permanently bleach the stained enamel of teeth with living pulps, as well as the enamel of pulpless teeth, and since many of my friends who have not seen the results deny that it is possible to bleach the enamel of teeth with living pulps, I thought this subject might be of sufficient interest to arouse discussion and perhaps to admit of a demonstration, if a suitable patient could be found. This method is especially valuable in bleaching the dark, chocolate stains that occur at times near the cutting edges of the centrals, laterals and cuspids of women, between the ages of twenty and thirty-five. I say women, because this stain does not come from the use of tobacco. It usually appears as a faint yellowish cloud on the enamel surface near the cutting edge. Polishing and superficial grinding do not remove it, and finally if it be allowed to remain undisturbed, it becomes a dark stain that disfigures what would otherwise be an object of beauty. The remedy is so simple that any one of you can readily judge of its efficacy.

The rubber-dam should be applied and the tooth dried with a

blast of air as hot as the patient can comfortably bear. Then a thin layer of cotton soaked in twenty-five per cent pyrozone should be laid upon it so that the stained enamel shall be thoroughly soaked. Next a broad, flat, hot instrument should be placed upon the cotton and the steam of the pyrozone driven into the substance of the enamel. A large piece of rubber-dam should be used and oil should be previously rubbed into the hands of the operator, as the steam generated by the hot instrument is caustic. This process should be continued for about ten minutes, when the cotton should be removed and a ball burnisher, hot as the patient can easily bear, should be ironed over the brown stain, driving out of the enamel all of the pyrozone that it has previously absorbed, and also bleaching the stain to an appreciable extent. This process should be continued for an hour, when the patient should be dismissed, being told to return again for other treatments at intervals of not less than two days, in order that the pulp may fully recover from any possible disturbance that the operation may have caused. I mention this purely by way of caution, as no patient of mine has ever complained of anything more than a few insignificant nerve thrills that were cheerfully borne in the light of the great improvement obtained.

Three or four sittings are usually sufficient to give satisfactory results. At the end of the last treatment, instead of pyrozone a concentrated solution of oxalic acid can be used to convert any iron that may have been present in the stain into a white oxalate, just as oxalic acid is employed in bleaching dentin stained with oxy-hemoglobin. While the oxalic acid has at times seemed to be useful, in the greater number of instances the twenty-five per cent pyrozone alone has been amply sufficient. This brings me to a very important question. Whence is the origin of this discoloration? Is it from chromogenic bacteria, is it from the saliva, or does it originate from the partial decomposition of organic material within the enamel structure itself? If the discoloration arises purely from external infiltration the explanation is simple, for the peroxid of hydrogen then soaks in and removes the stain, just as oxalic acid would soak in and remove an ink stain from a piece of chalk. But there are objections to this supposition, inasmuch as no colonies of chromogenic bacteria have been observed in the regions of the stains; and as the stains are local and not general the external infil-

tration explanation does not seem altogether satisfactory. If, however, the discoloration arises from the decomposition of organic material within the enamel structure the explanation may involve the credibility of the latest theories on the histological structure of the enamel, but this is a question that further research alone can determine.

Dr. H. A. Smith, Cincinnati: We are indebted to Dr. Head for presenting this simple method of bleaching the external tissue of the teeth. Heretofore our efforts have been confined to changing discolored dentin from within the tooth. It is interesting to study the chemical reaction which occurs in these bleaching processes. It has been stated that the hard tissues of the teeth contain ten per cent of water. By repeated heatings of the enamel as described a proportion of the moisture is removed, and judging by the results obtained the activity of the oxidizing process, whereby the change of color is effected, is greatly increased. It is a question, however, whether absolute dryness of the enamel would not in part defeat the object by preventing the prompt union of the oxygen liberated from the hydrogen dioxid with the discoloring agent of the enamel. Some teeth are "off color" normally, and it would be well to ascertain if this is the case before attempting to bleach. We assume that the normal pigmentation of enamel would not be readily affected, yet the hair is readily bleached by hydrogen dioxid, so why may not the color of the teeth—also dermal appendages—be changed in some degree by an oxidizing bleacher?

Dr. C. L. Goddard, San Francisco: I would ask Dr. Head if he has been able to remove stains from cracks or checks in the enamel or tobacco stains by this method.

Dr. Head: In view of my experience with stains on women's teeth, I tried the method on men whose teeth were tobacco-stained. One man from some cause or other had a condition of the mouth wherein large portions of the enamel had been dissolved off the teeth, starting from the cervical margin and working towards the cutting edge. One of his front centrals had about half the enamel left, and in it was a deep crack, thoroughly closed but deeply stained, evidently by tobacco. The tooth otherwise was sound, and I concluded to try this method. I had only two opportunities to bleach the tooth, but to my great surprise the first attempt made the stain fade from black to light brown, and the second bleached

all the enamel, but did not quite remove the stain from the crack. I am convinced that three or four more efforts would bleach even that remaining line. On incidentally making these applications to the other teeth that were deeply stained by tobacco I found that they also became white and clean. I would urge all of you to try this process on your patients, so that we may report next year just how many and how deep stains can be removed.

BODIES AND COLOR EFFECTS IN PORCELAIN INLAY WORK.

BY W. T. REEVES, D.D.S., CHICAGO. READ BEFORE THE NATIONAL DENTAL ASSOCIATION, AT MILWAUKEE, AUG. 6-9, 1901.

Needless to say, I am an advocate of high-fusing bodies, first, last and all the time. I will not enter into the field of high and low-fusing bodies, for if fully covered it will be enough for a paper in itself. Furthermore, I believe that the literature on porcelain inlays would be advanced if divided into its several fields and treated in separate papers, and the discussion following be confined to the matter presented in the paper, instead of trying to cover the whole ground in one paper and discussion.

Today I wish to present that part of the subject which pertains to obtaining the color desired in the inlay to match the tooth in which it is to be placed. The color of the enamel is practically the same in all mouths. The variations in the color of teeth come in the difference in the bulk, texture and color of the dentin. Therefore it has always seemed to me that an inlay or piece of porcelain that is to be joined to a tooth should be built up in the same manner, that is, made of three or more layers of bodies that are of different color and that fuse at a varying degree of heat, beginning with the highest and finishing with the lowest, so that subsequent bakings will not change what has already been baked, and that liability of disintegration from repeated firings will be reduced to the minimum, for at no time do I carry the baking beyond a good biscuit until the final or enameling layer is put on. This has been my practice in building inlays since 1893, and as our materials and facilities for work have been added to the results have been more and more satisfactory until there is hardly anything to be desired in the way of material.

With all inlays, either large or small, I first bake in the matrix

what I call the foundation, using some high-fusing body, building in as much, allowing for shrinkage, as will leave room for the layers of color and enamel that are to follow, carefully trimming away any excess at the margins so that the layers to follow will be of the same thickness at the joint as at any other point. Upon this foundation I build the colors that the inlay is to be, using strong enough ones to reflect through the final layer or enamel color. In this way you can vary the shade of the inlay at pleasure from the yellowest color at the neck of the tooth to the bluest tip—in fact using all the ranges of color met with in the natural teeth. Upon this I build the final layer, which I call the enamel one, and ninety-nine times out of a hundred it is a very light yellow or greenish tinge, which will modify or subdue the underlying colors so as to give a perfect match of inlay to the teeth.

To inlay workers whose practice has been to take a little of this, that and other bodies, and mix them together until a shade is obtained that is a general match of the tooth, this may seem a radical departure, but by this method I believe the one great thing desired can be produced, a translucent, natural looking imitation of tooth structure; and the more varied the colors in the tooth you are trying to match the more sure you are of obtaining them in this way, for these are underlying colors and not surface ones.

A second advantage is, that you avoid the great bugbear called "the shadow problem," for an inlay built up in this manner, of three or more layers of bodies that are of different color and that fuse at a different degree of heat, will break up the direct absorption and reflection of light rays and will look almost absolutely the same from whatever angle, point of view or distance you look at it. I never mix two or more bodies together to vary the shade of one, for you can get any shade desired of a given body by the thickness of the layer you put on, and a little practice along this line will give you more true artistic ability in producing color effect than all the tabulated proportions of body mixing you can accumulate. One point I want to emphasize, and that is the cultivation of the faculty of looking for underlying colors. A person may have a good eye for a general effect, and be able to select a facing and make a porcelain crown that placed between two natural teeth cannot be detected, yet not be able to match a tooth perfectly with a porcelain inlay because of the failure to see the underlying colors in the tooth;

for if you cut off the corner of either adjoining tooth and cut off the corner of the facing and set against the tooth it would not match at all. I might illustrate this best by citing the case of a dentist who called me in to pass judgment on the color he had selected for three inlays on the labial surface at the cervical margin of two centrals and a lateral. He showed me the color that he thought would be right used over Close body, and I asked him if he did not see a little different underlying color in each tooth—reddish brown in this, gray in that, and still a different color in the other one—and he did not, but he asked me to name off the bodies just as I would use them, and he made a memorandum of the colors and baked his inlays accordingly. I did not see them when finished, but of several dentists who were called in to see the inlays some could not find those underlying colors. He told me afterwards that he could not see them at all, but that the inlays were a perfect match, and he did not think they would have been if he had baked them as first intended.

One other point I wish to bring to your attention—the possibilities there are in the use of what I call primary colors—teeth which at the cutting edge have that steel blue tinge that is so baffling, or those deep gray colors, tobacco-stained teeth, those yellow mottled ones, etc., which when indicated are wanted very badly. I attempted to secure the effect desired with mineral china paints but had very poor results. One manufacturer made up five of these deep colors (that are high-fusing bodies and not mineral paints) to meet my wants. At first I had some difficulty in making a water mixture that would go on smooth and be thin enough, when the inspiration came to grind them up in lavender oil, as china-painters grind their mineral paints, and apply them with a brush, and the result was very satisfactory.

Another thing I wish to say is, that I believe it is a mistake to try to make an inlay in one or two bakings. The objection some might make to my method, that it would take too much time to bake an inlay three, four or five times, is practically done away with now that we have the Hammond furnace, for on an average I can do a baking once in ten minutes. That is, an inlay I bake three times would be finished in half an hour from the time I put it in for the first baking. Some bake in the Hammond furnace faster than that, but competition with time has no place in inlay work.

To Dr. Jenkins of Dresden belongs the credit of arousing the interest of the dental profession to the possibilities of porcelain inlays, but to those who build their work on high-fusing bodies will come the credit of the permanency of porcelain inlays.

All successful inlay workers are enthusiastic, and some will say that an enthusiast cannot see beyond his own horizon; but there is no work in operative dentistry that enthruses a person so much as the successful making and setting of a porcelain inlay, with the consciousness that it is going to give the patient the best service that is possible with any material we now have for restoring decayed tooth structure.

Discussion. *Dr. Joseph Head*, Philadelphia: While heartily commending Dr. Reeves' paper, certain difficulties present themselves to my mind which his process does not seem to have altogether removed. I can see that a layer of yellow approximating the color of the dentin, covered by a layer of porcelain equivalent to the color of the enamel, would greatly assist in giving a lifelike appearance and reproduction of the tooth structure; and if we had an absolutely transparent cement such an inlay should give a perfect match. Unfortunately, however, if the corner of a tooth is broken off, and then cemented on with a nontransparent cement, the color problem still confronts us. While at certain times and in particular positions and from various points of view this corner has a lifelike color, there are other occasions when it does not resemble the original shade of the tooth. All matching is dependent upon two things—the kind and the amount of color. Take for instance a labial cavity. It is with such an inlay that we most often attain almost perfection, not only because the proper color has been chosen, but all the color is reflected directly back to the eye. The tooth is almost always looked at directly from the front, so there is no passage of light into the mouth and no opportunity is given for a shadow to be produced. If, however, we have a moon-shaped cavity on the side of the tooth, involving both enamel walls, the light, instead of being reflected, passes on into the mouth and we have only half of the true color, and therefore a much darker shade. While Dr. Reeves' method will be of much assistance, we can hardly hope to solve the shadow problem until a transparent cement is obtainable.

Dr. C. L. Goddard, San Francisco: I recently hit upon a

method of overcoming one of these disadvantages. In giving a clinic, I noticed that my patient had a large gold filling in a central incisor. The cavity was a mesial one, extending both labially and lingually, one of the kind which will make an inlay show a different color because the rays of light pass entirely through it. I therefore cut out only the anterior portion of the filling, and made an inlay which entirely concealed what was left. The light was reflected directly back from this inlay, not being able to pass through the layer of gold. With all deference to those who were so enthusiastic over high-fusing bodies, I must say that my only experience has been with the Jenkins' bodies, using No. 30 gold for the matrix, and I have been surprisingly successful.

Dr. L. E. Custer, Dayton, O.: The most disappointing feature about porcelain work is, that after you have properly matched the color of the tooth the appearance of the inlay may be spoiled in the setting. If Dr. Reeves' method is practicable it will be a great boon, but I have yet to be convinced that the use of different colored porcelain throughout the body of the inlay will overcome the shadow problem. I should like Dr. Reeves' views on taking an impression and burnishing a platinum matrix into the cavity itself.

Dr. Reeves' closing discussion: I see no occasion for taking an impression of the cavity, but in very deep proximal cavities in molars and bicuspid, running above the gum, I usually take an impression, simply to get the first burnishing of the matrix, so that I may trim it at the cervical margin and not hurt the gum tissue, but I always afterwards burnish it into the cavity. Regardless of criticism, I must say that I have made inlays for all colors of teeth by my method, and have been able to match up the very difficult ones just as satisfactorily as the common shades.

COMBINATION OF GOLD WITH PORCELAIN.

(By a Crown Worker.)

This is a subject of unfailing interest to the practical man and one that well illustrates the axiom, "Many men of many minds." That part of the question relating to the combination of gold with porcelain, so combined under the blow-pipe as to produce a perfect result, is one that cannot be gone over too often, in consideration of the varying ideas as to the causes of imperfect results. The young man just starting out in his profession may be puzzled by opposing

opinions, and every one having had a measure of success ought to contribute from his experience. As the result of some years experience, and from failures as well as from some laboratory tests, I can deduce certain data. With this deduction is to be considered method, and as methods vary the results are to be judged from the method.

The causes of checks or cracks in the porcelain and gold work may be reduced to four heads—First, the slightest moisture in the investment when the flame is put on by blow-pipe; second, sudden though slight changes in temperature; third, any contact of flux with porcelain; fourth, the boxing in of porcelain by extension of the backing.

How is one to know when the last trace of moisture has been driven from the investment? Small pieces are encircled with a tiny loop of picture-wire and invested in Chase compound. After the wax is all picked out the assistant takes the case in pliers and with a to-and-fro motion through the bunsen flame dries it. It appears to be dry when it is not yet so, for even after it smokes a little from the traces of wax melting, holding it close to a cold metal surface or mirror will show moisture. So much for the first cause.

My father had a long experience in metal plate work. In backing up gold cases care was taken with each separate backing, and before its final adjustment the porcelain surface beneath and all exposed parts were coated with a thin paste of whiting and alcohol. He said distinctly that liquid flux coming in contact with porcelain would check it. I wonder if other of the older dentists believed that by flooding their work with flux they obtained water-tight joints.

The best fitted backing of either pure gold or platinum is but approximate to the surface of porcelain and pins, and flux can work in, but the coating of whiting prevents contact where it is not wanted. The heating up of the work may be progressing with the drying out, during which the surfaces to be flowed with gold are touched by the flux on a camel's hair pencil and small pieces of solder are laid all over the backing and cap. When it is proven that the piece is fully dry it is gradually heated up in the bunsen flame. Meanwhile the soldering block is under the blast of the blow-pipe. This is an asbestos block upon which pieces of glowing charcoal the size of a pea form a nest for the investment. The investment is transferred at a dull red to this block. The large flame

is put all around the piece at first. After the soldering is completed the work is protected by a previously heated cover. By this method there are absolutely no sudden variations of temperature, and it is of course true that the smaller the investment the greater the care necessary in this respect. This disposes of three causes of checking, and it remains now to examine the subject of backing porcelain with either gold or platinum.

Taking for example any one of the six anterior teeth, the porcelain is at first ground to the root face or cap, then the incisive edge and its approximating sides are ground to an angle of about 45 degrees and the tooth placed in water and boiled to remove wax. Gold is preferable to platinum in the majority of cases, and when pure and annealed it is as easily adapted as the thinnest platinum and will burnish clear to place as the latter will not. After adjustment the slightest pinch of the cut back pins will hold it securely if the piece has been properly punched.

Now with the finest flat-face file the backing is finished up to the outer edge of the porcelain with push cut only. The extension of the backing beyond the facing is wasteful of material, time and labor, and wholly unnecessary, besides being risky if curled at all upon the porcelain.

In conclusion, it may be said that there has been evolved nothing as yet that equals the Richmond crown for correct alignment, and at the same time preservation of root substances and form—both outer and inner, and there is nothing that stands heavy stress as well unless it is an all gold crown. Difficult as it often is to secure the most satisfactory results with other forms, one is not compelled to sacrifice substance in canal reaming for a Richmond crown as with other styles.

Iridio-platinum wire—preferably round—gauge 13 to 17, is at hand to meet the requirements of each case. True, the facings will snap off occasionally, but it is most often caused by inattention to the niceties of occlusion upon crowns in the anterior region of the upper jaw. It need never occur from peculiarities of articulation or from incision of food, because every piece of porcelain is protected upon its incisive edge, though wholly invisible from the front.

TIC DOULOUREUX.—According to *Merck's Archives*, Dr. Grandclement has successfully treated several cases of tic douloureux with hypodermic injections of antipyrin and cocain in combination.

Digests.

DISEASE OF THE GUM BORDERS AND SOCKETS OF THE TEETH. By C. M. Wright, D.D.S., Cincinnati. Read before the Tri-State Dental Meeting, at Indianapolis, June 6, 1901. A quarter of a century ago little attention was given to this condition by the great body of dentists, further than to extract loose teeth and those surrounded by spongy and bleeding gums. Enucleation was a surgical operation of considerable dignity with the dentist at that time. It was largely employed for "ulcerated teeth," for persistent fistulæ from the roots, and by many even for molars and bicuspid with "exposed and painful nerves."

Riggs' disease, *alias* pyorrhea alveolaris, phagedenic pericementitis, interstitial gingivitis, osteitis purulosa, pericemental necrobiosis and other histological and pathological *aliases* has been passing through all the fluctuations of theoretical and experimental eruptions; yet its etiology is really no more obscure than that of catarrh of the respiratory passages. In therapeutics the general practitioner, as well as the specialists in rhinology and laryngology, find just as good a field in catarrh for continued treatment and permanent income (Whittaker) as the dentist can in this disease about which we are writing. In catarrh the causes are undoubtedly both local and constitutional. If the causes were purely local the disease would be limited to one or two recognized phases or stages, like hyperemia with its bland secretions, or simple acute inflammation with the more strenuous efforts on the part of the blood and tissues in the direction of regeneration, and with no tendency toward recurrence after the local irritant had been removed.

In this disease the circulation of the part is disordered, and we have in many cases an active and afterward a passive hyperemia or congestion; simultaneously we have exudates from the blood, which vary according to the progress of the disease and changes in the circulation and tissues. A serous secretion at first may later be fibrinous, hemorrhagic, muco purulent, purulent. The tissues in this circumscribed area are soaked with an excess of blood exudate, and take on disordered nutritive action, become reduced to conditions resembling embryonic tissue; but the cellular elements multiply and try to organize and rebuild. Irritants from without, mechanical

and chemical, and obstructions and toxins from within oppose the struggle for existence on the part of the protoplasm of the cells, and we have the complications of a *chronic* disease. At any stage of the conflict the dental surgeon can afford aid. With his specially educated touch, his well-tempered instruments, selected to suit his own hand, and with disinfectants and other agents that promote waste or stimulate and encourage repair, he is well equipped to battle with local irritants and aid the efforts of the tissues.

When we reflect upon the methods the tissues themselves display in efforts toward a physiological type, dealing with the exudates and necrosed tissue by absorption or sequestration and expulsion, and in the meantime by granulation and regenerative methods struggling to repair and restore to health, we can understand that the more perfect our recognition of the exact pathological state at any given period of the disease, the better able shall we be to assist rather than hinder these efforts on the part of the tissues themselves. Therefore *judgment* is as important as surgical dexterity and thoroughness on the part of the operator.

To lay out for your inspection a lot of instruments, or to define when to use iodine, hot water, trichloroacetic acid, or any other remedies, is not the business of this paper, though it is the business of the surgeon to know about them. Simply to indicate clearly the relation this disease bears to others, to classify it, to define its position in pathology, in therapeutics, in dentistry, and, if I may say, in comparative specialism, is all that falls to my province. The disease generally presents catarrhal, interstitial and phagedenic inflammatory phases, because of the kinds of epithelial and connective tissues involved and because of the location and unique characteristics of the arrangement and interdependence of these tissues.

Histology shows us that the pericemental connective tissue in early life is less dense and fibrous, and more myxomatous than in middle life and old age; that these periodontal membranes are prone to senile changes and degenerations liable to obsolescence; that there is probably a glandular excretive function of the epithelia just under the free border of the gum. With such transitional structures, so functionally complex, and in such exposed situations, inflammations may arise from causes ectogenous, and these innumerable, as we can readily see, such as calcareous deposits, food debris, bacterial activity, traumatic injuries, tooth-brush bristles, and a host of

other things, or causes hematogenous or lymphogenous, such as waste products in the plasma that have exuded from the capillary loops of the parts and have not been carried away by the lymph. Any of us can picture the irritation that might produce inflammation in these gum borders from a disabled kidney or a torpid liver, or from autoinfection from the alimentary canal, or from nerve exhaustion; all manifesting themselves as secondary results of earlier specific causes. The history of this disease in man and domestic animals points to the fact that these gum borders, liable as they are to degenerations, are intimately dependent on the functional health of possibly every gland, membrane and nerve center in the body, and on the quality and quantity of the body juices, on cachexiæ and diathesis.

I have been accused of not making positive statements in some former essays, and here I wish to announce that this Riggs' disease—let us call it so out of compliment to this early systematic student of the trouble—has as many remote, predisposing internal or systemic causes as has catarrh and the eczemas, and offers as wide a field for the specialist's treatment—this specialist having the broadest possible general medical training—as does chronic nasal catarrh by the rhinologist and the eczemas by the dermatologist.

Let me be positive again. The far away predisposing cause of Riggs' disease is frequently a neurosis. The neurasthenic, professional and business man; the stay at home wife, overburdened with the monotony of her existence; the epileptic and paralytic exhibit this disease as a sequence of neurosis, and, as the psycho-physiologist might show, as a result of abnormal emotions. Now the dentist who attacks the local manifestations is acting in a perfectly reasonable and logical manner, and does much good by his delicate surgery and topical treatment, but the remote causes remain alert and ready for attack at any time that local opportunities offer. When we can treat and cure gland disturbance and rebuild nerve tissue, and strike the hydra headed gout and put all the blood elaborating and waste-eliminating organs within the pale of physiology, with all that this means in the struggle for an existence, we may prevent this disease from occurrence and recurrence, and we are no farther away from this millenium of therapeutics than are our brilliant and worthy confreres in other departments of medicine.

The sensitive nerve terminals and reflex motor responses, the

capillary circulation, the leucocytes congregated at the point of distress, are all sensitive to local impressions and susceptible to intelligent medication. And it may be proper to assert just here, that in the treatment of constitutional phases, or more remote special organs like the nervous system, or the intestinal tract, or other diseases like syphilis or tuberculosis, or concurrent catarrh manifestations, consultations with the family physician or other specialists should be insisted upon for the benefit of the patient, so that the broadest measures in therapeutics may be adopted and harmoniously carried out by the combined knowledge, methods and training which are the result only of special study. I have no sympathy with the specialist who is sufficient unto himself, whether his practice is confined to diseases of the nervous system, to surgery, to internal medicine or to general practice.

Local treatment has in many cases proven successful in catarrh, in eczema and in this disease. Extraction cures caries and it cures alveolar abscess and pyorrhea alveolaris, but the aim of the dental surgeon of to-day is to save teeth. May I suggest that as in the local treatment of this disease of the gums the most delicate and intelligent surgery is required and a persistent patience not necessary in more brilliant efforts, like the removal of a tumor or the mastoid operation, so called, and as time and skill are the business assets of the operator, all old ideas about compensation that have grown up between dentist and patient must be done away with. We are placed in the curious position of being able at any moment, by surgical elimination, to effect a radical cure of the disease, and yet our earnest desire and the demands of cultured patients are all for the saving of the teeth. We have become imbued with the doctrine that the dentist's highest aim is to save to usefulness and beauty the natural teeth. Our lives are spent in this effort—in fighting the diseases which threaten the destruction of these organs. We fight caries, pulpitis, alveolaritis and Riggs' disease—not a very long list, but chronic, progressive and complicated in character. This special Riggs' disease is the most destructive in its effects upon the patient and upon his teeth, and requires longer, more persistent and more frequent operations than any other, not excepting caries. The recognition of these facts is important to dentist and patient.

The adjustment of compensation to the dentist for his efforts in battling with Riggs' disease must be upon the plane of the other

specialists in medicine who treat the eye, ear, nose or throat. If we can not rise to this plane (and this may be why many dentists offer no hope of palliation by treatment), then we should retire to the older platform and recommend extraction and plates.

The general health of the patient afflicted with Riggs' disease demands intelligent and perhaps prolonged treatment and constant watchfulness, followed by persistent hygienic attention, or the radical cure by extraction; and we, as conservators of the health of our patients and in the interests of preventive medicine, should plainly state the case to those who come to us for advice.

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SUN'S RAYS IN TREATING DISEASES OF THE SKIN.

By Geo. E. Abbott, M.D., Pasadena, Cal. Of all diseases of the skin which the conscientious and sympathetic physician encounters, perhaps lupus is the most trying and distressing, but when successfully conquered it gives the most satisfaction, at least to the operator, for he knows its awful ravages in neglected and uncontrollable cases.

I am passing around some photographs of patients treated by Prof. Finsen, at the Finsen Institute, where he has under treatment some 200 cases of lupus in all stages, some treated by the sun's rays, some by electric light. His method by the sun treatment is to use a lens eight inches in diameter, fitted into a band of metal about three inches wide and closed at the other end by a piece of plain glass, making a chamber or drum which is filled with water, colored with sulphate of copper. This gives only the blue and violet rays and cools their fierce heat. I have summarized his results as follows: Case No. 1 was treated for one year and six days with fifty-five sun and one hundred and fifty-one electrical treatments. Case No. 2. Time, one year, two and one half months. Thirty-four sun and one hundred and forty-five electrical treatments. Case No. 3. Time not given. Fifty three sun and one hundred and seventy-five electrical treatments. Case No 4. Time, six and one-half months. One hundred and twenty-six electrical treatments. Case No. 5. Time, two months and six days. Number and kind of treatment not given. It will be seen by these photographs that, whereas there is a decidedly blessed result, and the patient is cured, nevertheless there is a very evident scar remaining.

It may be unwise in me to criticise Dr. Finsen's work, but I must

claim some advantages for my own treatment, for I claim to secure the same results as those of Dr. Finsen, viz, cure and a minimum scar tissue; and to do it in a month with five or ten treatments, rather than in a year's time with over 200 treatments, each one of which is a protracted sitting. He has the advantage of a large bill, I the reputation of quick work, with time in which to earn other money. His apparatus is costly and demands government aid, mine costs two dollars for a good sun glass of $4\frac{1}{2}$ inches in diameter, fifty cents for some smoked glasses, twenty-five cents for the chloroform, one dollar for a leather punch, and a nickel for the leather shield; \$3.80 in all. Dr. Finsen's method demands a trip to the European doctor on the part of the patient, mine a trip to the Californian patient, on the part of the doctor.

Dr. Finsen's experience has been very large and mine but limited, perhaps fifteen or twenty cases in all, yet my results have been entirely satisfactory to me and my patients, except one in which I used Dr. Finsen's treatment for some months and exhausted my patience and that of my patient, so that we both decided to call a halt and declare war under chloroform, when matters were brought to a favorable issue at once.

The use of the sun glass is efficient in removing small moles and warts, in increasing the growth of hair, in hastening the cure of eczema, and, under either local or general anesthesia, in the total destruction of lupus, cancer, and other growths of the skin. It is not to be compared with the knife, yet is at times superior to it. It does work that the cautery and caustics cannot do on account of the chemical action of the sun's rays penetrating deeper than the caustic action. Its use should be acquired by every physician, as it is exceedingly simple, yet it requires some experience and care, in fact, a great deal of both, when dealing with the facial blemishes of young ladies where scar tissue is to be dreaded.

In operating one must protect the surrounding healthy skin by a leather shield, the hole in which should be cut out with a punch or knife, so as to fit accurately the contour of the diseased part, and in operations near the eye or nerve tracts additional precautions should be taken. The doctor should wear smoked glasses because of the blinding effect of the exceedingly bright focal point, and at the same time the glasses should be worn well down on the nose, so that the operator can frequently glance over the top of his glasses and real-

ize the full effect of the sun's rays. Allow me to give one word of caution lest some should desire to do too much at once. Go cautiously, let your patient return several times, rather than burn so deeply as to leave an unfortunate scar.—*So. Cal. Practitioner.*

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CHRONIC ALVEOLAR ABSCESSSES. By George E. Hunt, D.D.S., Indianapolis. Chronic abscesses, like the poor, we have with us always. And to complete the analogy, they are never wanted, are always needing attention, and are often distinctly ungrateful for services rendered. To understand their pathology it is necessary that we take a brief glance at the life history of their predecessors, inflammations. The only really good definition of an inflammation that the writer ever saw was one perpetrated by the professor of pathology in the medical department of one of our leading Western universities. It covered three and a half pages of a large book, printed in small type. Most writers on the subject start out with a lame three or four-line definition and use the succeeding thousand words to define the definition. A much easier way is to pass over the definition altogether and recite the course of the disease.

The foundation for an inflammation is always an irritation of living tissue. Without irritation we can have no inflammation. Inflammations in the alveolar process—those which may in time lead to chronic abscesses—are due in probably 99 per cent of cases to a decomposing pulp in a tooth. A pulp dies from some of the many causes that lead to this result. It is kept moist by the seepage of liquids through the apical foramen and the temperature being right, it forms a most admirable culture medium for the bacteria of putrefaction. While it is in this condition a party of the Coccied Tribe, on a "Home Seekers' Excursion" through the blood channels, chance to take a branch line running from the great "External Carotid and Internal Maxillary Through Line," and as Hans Coccus looks out of the war window and sees the eligible homestead territory he hails his companions, falls out of the car—they run these "Capillary Branch Lines" slowly on purpose—and followed by the whole crowd laboriously works his way across the—to them—barren, healthy ground, to the "Land of Promise" in the root canal, where that poor little tooth pulp absolutely "irritated to death," has ceased to functionate. On their arrival Hans and his friends doff their coats, roll up their sleeves, moisten their hands,

and start to work like the industrious German emigrants that they are. (Do you notice the nationality I give these microbe "home seekers?" That is the subtle way in which I pay my compliments to Flugge, Kock, Miller, and other native and adopted German pathologists for their work in this line.)

You will perhaps notice a discrepancy in my opening remarks, inasmuch as I mention a dead pulp as the usual cause of an alveolar inflammation, when it is patent to all that the irritation leading to the inflammation and subsequent death of the pulp must have been the primal cause. I omitted a description of that in order to save time. The progress of an inflammation in any tissue and in any part of the body is the same, if due allowance be made for varying environment.

So Hans, Gretchen, Josef and the rest begin to industriously cultivate that, to them, fertile spot. They wax merry and grow fat. They propagate children faster, far faster, than rabbits in a warren. Their progeny bids fair to populate the district in a short time. Hans is elected governor of the colony, and Gretchen divides her time in putting forth new Gretchens and gorging herself on the fat of the land. So does Hans. In the evening they gather in the town hall and over a bowl of wassail repeat traditionary tales of unctuous feasts their progenitors had in various settlements in times gone by. These settlements had been made at various times in Equinopolis, Canineville, Rodentown and Felineburg, and in each case the country was "dead" before the ancestors of our emigrant friends had selected it for residence. All was merry as a marriage bell, and the colony was considering the advisability of organizing a company to put in electric lights and a street-car system from the pulp-chamber to the apical foramen, in order that communication between the uttermost points of the colony might be facilitated. A sewer system was also badly needed. In fact, the infant colony had been so busily engaged in settling up the territory that the removal of the effete material thrown off by the settlers, the burial of those who perished from old age, and other little matters of that sort had been totally overlooked. It now began to press on their attention. Hans always prompt to act in an emergency, organized a civil engineer corps, consisting entirely of Streptococci, to survey the environs of the country and determine the best direction in which to enlarge their dominions, with an ultimate view of getting

rid of some of the foul debris that was killing off so many of the inhabitants. The thing was rapidly assuming the proportions of an epidemic.

The engineering corps was composed of Streptococci in order that they might use their chains in the measurements. In the course of a short time they reported back to Hans that the territory was bounded entirely by bony walls, penetrated by thousands of round caverns. Many hundreds of these caverns had been entered by members of the corps and their progeny, for even at work these people multiplied with surprising rapidity, but as the quantity of food in them was not great, and the further end generally looped around and led back to an opening near the original one, they soon tired of passing into them. It was too much like the pig who passed in at one end of a hollow log forming part of a fence, believing that he would come out at the other end in the turnip field toward which he had been looking with longing eyes and watering mouth, only to find, to his astonishment, that the log was so crooked that his exit occurred in the field of his entrance. They reported the existence of these bony walls in every direction but one, and that was the point at which the settlers had entered—the apical foramen.

On hearing the report, which was read in a loud voice by a fat Streptococcus with a flowered vest and having his hair parted in the middle, Hans ordered that unremitting efforts be made to soften up and dissolve away the bony covering wall in every direction, and that a large detail be sent to the apical foramen, with orders to invade the territory beyond the foramen and begin a settlement there.

In order to understand the subsequent proceedings it is necessary that we glance for a moment at the condition of the country around the apical foramen, and the inhabitants thereof. Unlike the pulp-chamber and the canal country, this tract was in a state of perfect health. Nerve, blood-vessel and connective tissue cells, the inhabitants of the tract, were attending strictly to business and performing their functions with the regularity of clockwork. The blood was busy bringing food to these hard-working cells, who selected that suitable to their wants from the slow-moving provision trains passing through the "Capillary Route," and incidentally loaded up the blood current with a quantity of carbon dioxide that had been evolved from the metabolic changes in their territory.

Several matters which might properly be termed "domestic economy" were ingeniously looked after in this country. The inhabitants were fully as industrious as their new neighbors, the German emigrants, and were a good deal more sanitary in their lives. Epidemics, due to the presence of their own excretions, were unknown. The carbon dioxid which was formed during functionation was carefully loaded into the blood current and carried to the lungs, where it was emptied into the air. Such food as was not fully used was taken up by a canal system run by the Lymphatic Glands, members of the swell set in that country, and converted into suitable nourishment. Order, system and regularity prevailed everywhere. Each inhabitant had his own work to do, and his own territory, known as intercellular tissue, to cultivate.

A remarkable feature of the system of the country was the presence of hundreds of citizens in white suits, who acted as policemen, scavengers, soldiers, and in many other useful capacities. These gentlemen were very round and fat, and were known as leucocytes or white corpuscles. They looked for all the world like Colonel Waring's street-cleaning brigade in New York. They passed much of their time on the road in the Circulatory system. This system, by the way, was a greater power in the land than the Big Four and the Pennsylvania lines put together. If there was ever a strike by the men at the power-house—a large, muscular edifice situated in Thorax, one of the districts of this country—and the Circulatory system was tied up for a moment, all the inhabitants simply closed and went into the worm business, and they stayed closed, too.

It chanced that about the time Governor Hans sent his detail of Streptococci from the Sixth ward down to the apical foramen, two amiable looking leucocytes took a half-day off, and shouldering their fishing poles, set out for a bit of sport in the Sublingual Ducts, a network of streams leading from the Sublingual Gland, the lake about which the learned Mr. Brain Cell had recently written such perfectly lovely poetry. Their way led them in close proximity to this very apical foramen that the Streptococcus crowd was approaching. Suddenly one of the leucocytes, known as the Siamese Twins, because he had two nuclei—his companion was known as Cyclops because he had only one neucleye—stopped and facing up wind sniffed the air with suspicion and a pug nose. Cyclops imitated his example. The horrid truth was borne in upon

them. The country was about to be invaded by their hereditary enemies, the Coccied tribe. It happened that Siamese Twins and Cyclops had recently been involved in a bout with another branch of the Coccied people, at a boil in the Cervical Territory, and remembered the odor which accompanied active operations on the part of the enemy. All the leucocytes had a great nose for bad smells, anyhow. For a moment our two leucocyte friends were too alarmed to act. Suddenly, with a unanimity born of an equal amount of trepidation, they cast away their fishing poles and set across country, calling for help at every jump. Being rather rotund, their progress was necessarily slow. They traveled entirely by lymph channels, as every time they started to take a short cut Cyclops would get his feet all tangled up in a mass of nerve tissue and the inhabitant of that particular cell would cast opprobrious epithets at him and threaten to punch his head. Eventually they reached the nearest capillary branch line, where they informed a large squad of leucocytes—on their way to the Antrum of Highmore Territory to see a game of baseball for a keg of oxygen between nine of themselves and nine red corpuscles—of what they had smelt. In a moment the most intense excitement prevailed. The Leucocytes had fully intended to thrash the umpire—a long, lean, muscle fiber just out of jail, he wore stripes—but this promised greater opportunities than the umpire. Several of their number were left to notify all leucocytes that came along of the impending danger. Other leucocytes went to the nearest nervograph office and sent nervograms to their friends to come on and join in the fight, and the balance, with Siamese Twins and Cyclops at the head, their courage restored by the presence of friends, started for the apical foramen.

And now, had I the genius of a Sue, a Lever, or a Dumas, I might perchance do justice to the terrific combat that ensued; but being of a rather peaceable disposition, it is certain that the carnage and merciless blood-thirstiness of this awful combat will never receive proper treatment at my hands. So soon as the small party of Leucocytes and Cocci met they fell on each other with the greatest fury. Poor old Cyclops fought hand-to-hand with the Cocci leader with the greatest intrepidity until his wind gave out, when he was promptly tripped and his nuclei cut out, and that settled him. Shouts of "Was Heil"—German for "What t'ell"—

"Donnerwetter," and other language unfit for publication mingled with the war cry of the Leucocytes. This latter, which was yelled with an immense amount of power and energy, ran something like this: Watch me fight, With all my might, I am a husky little Leucocyte. 'Rah, 'Rah, 'Rah. Cor-r-puscles-s-s-s.

The scene was Homeric in its intensity. The peaceful inhabitants in the neighborhood—bone cells, etc—were knocked on the head and their intercellular substance melted down, so hot was the contest. More Leucocytes came crowding to the spot. The alarm had gone forth and every Capillary in the vicinity was fairly leaking leucocytes. They crowded over one another in their efforts to get to the scene of action, and several extra fat ones struggled in a perfectly frantic manner in their endeavors to pass through the small stomata provided by the managers of the Capillary branches for exit.

And the Coccid tribe was equally as brave. In the early part of the contest they had decidedly the best of it. Governor Hans, who hastened to the spot on being informed of the outbreak performed prodigious feats of war. He rolled his r-r-r's in "Donnerwetter" until he almost choked to death and actually gasped for air. Many Cocci penetrated far into the ranks of the Leucocytes and perished alone but gloriously in the midst of their enemies. In a short time the original spot of combat was a desolate territory, filled with dead and dying Leucocytes and Cocci, disintegrated cells and intercellular structure. Pus was present. Surrounding this was a section where "grim visaged war" had not "smoothed its wrinkled front" by a long ways. Here the battle raged the fiercest. Leucocytes and Cocci were about evenly divided as to numbers and each struggled heroically for mastery. El Caney was a matinee musicale compared to the battle of the Apical Foramen. This section, where the fight raged the hottest, was gradually enlarged as the Cocci drove back the Leucocytes and destroyed more bone, connective tissue and other cells. The open space where the fight began gradually became greater as more territory was broken down, more Cocci and Leucocytes perished. Beyond this circle of greatest activity was an area filled mainly with Leucocytes pressing to the front. Among these might be found a few daring Cocci who had penetrated far in advance of their fellows in their search for adventure. As a rule these perished, not ignobly but borne down by superior numbers.

It finally became evident that nothing less than an absolutely overwhelming array of force would ever convince the invaders of the futility of their efforts, so more nervograms were sent, more Leucocytes arrived, and more, and more, and more. The "Capillary branches" in that neighborhood became so gorged with Corpuscles that there was no room for food in them. The circulation in the immediate area was cut off.

When Hans and his followers saw this vast multitude of white-coated gentry and realized how completely they were outnumbered, they felt that defeat was inevitable unless something could be done. And when was Hans ever remiss if there was something or somebody to be done! With the instinct of the born soldier he realized that nothing but strategy would prevent the utter annihilation of his people. So calling his Board of Strategy about him, he informed them of his plans and gave the necessary orders. Leaving enough of his men around the edges of the field of battle to mask the real movement he intended to make, the main body of the Coccied army was massed on the side nearest the mucous membrane overlying this area. With a rush and a shout the Cocci began their charge to the surface. The Leucocyte leaders saw too late how they had been beguiled. They rallied their forces and tried desperately to break the charge of the advancing Cocci, but in vain. The charge up San Juan Hill was a Delsarte exhibition compared to the mighty rush of the Cocci when they had determined on a definite line of action. On and on they went, cutting and slashing, with Leucocytes to right of them, Leucocytes to left of them, Leucocytes in front of them, fighting like thunder! It was in this last mad charge that Hans met his fate. Poor fellow! He died—like Shaw, the Life Guardsman, at Waterloo—surrounded by the dead bodies of his foes, mute tributes to his valor. He was a great stinker. Peace be to his ashes.

The bursting through the mucous membrane and the emptying of a large part of the mass of dead, dying, decomposed and disintegrating tissue cells into the oral cavity, caused an almost immediate change to take place in the territory so recently harried by the opposing warriors. The Leucocyte leaders, who had had some experience in these affairs, knew that the usual result of this condition was the eviction of the whole mass of Cocci and a restoration of normal function in the disturbed parts. So giving orders that

the lost tissue should be repaired with scar tissue, they took the nearest lymph channel for the Viscera country. Agreeable to order, hundreds of thousands of their followers did the same. Thousands of others, who had been too late to join in the fight, passed on in the blood current instead of coming to the stricken spot, and in a short time the circulation in the adjacent territory was as peaceful and business-like as ever.

But when the Leucocytes that had been left behind began to replace the lost tissue with scar tissue they encountered some difficulties. It seems that while the larger mass of Cocci were swept away by the evacuation of the abscess, there had been quite a force left behind in the root canal of the tooth, their original settlement. These now sallied forth and a bushwhacking, predatory warfare began. The Leucocytes industriously strove to build up scar tissue by the aid of the connective tissue cells in the vicinity. The Cocci as earnestly strove to break it down. Remote from the scene of action the mucous membrane had been promptly repaired. But every once in a while a mass of Leucocytes and Cocci would come struggling and fighting down the fistula made by the original great charge, followed by a drop or two of dead cells and disintegrated tissue. The newly repaired mucous membrane would be puffed out, until it finally broke through and the whole mass was evacuated into the mouth. This thing occurred repeatedly. At times it was so constant that the membrane had no opportunity to heal, and the pus seeped out all the time. The tissue along the fistula became so depressed by these frequent sorties that it had no energy to repulse the attacks of the Cocci.

After a long and severe struggle it was finally decided by the Leucocytes that while the root canal remained in its septic condition, giving a shelter to the Cocci from which they sallied forth to do battle as often as their increase in numbers would permit, it was useless to try to replace the lost tissue. So efforts were directed to confining the Cocci in the territory devastated by them. To this end the entire energy of the connective tissue cells in the neighborhood was devoted to building up a wall of white fibrous connective tissue around the abscess. The history of this wall would rival that of the siege of Troy. Every step was vigorously opposed by the Coccid warriors. Every cell was added at the cost of a Leucocyte life. But bit by bit superior training and numbers told. The

wall was erected and the Cocci shut off to themselves from the normal tissue beyond. This wall was composed of the same material—scar tissue—that the whole tract was to have been filled with, which process had been rendered impossible by the presence and activity of the Cocci. And so the matter rested. The Cocci repeatedly attacked this pus sac or wall, and frequently made some inroads on it, but the Leucocytes were eternally vigilant, and as constantly repaired, reinforced and strengthened it as the Cocci broke it down. The fistula was kept open, or partially so, all of the time, and at intervals a mass of fighters would pass down it, to burst through the mucous membrane and be lost to the sight of their friends forever.

And this is a chronic abscess.—*Desmos, Nov., 1901.*

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CONGENITAL ABSENCE OF ALMOST THE COMPLETE TEMPORARY DENTITION IN A CHILD FOUR YEARS OF AGE; RESULT OF THE TREATMENT BY MEANS OF A PLATE. By George Cunningham, M.A., L.D.S., D.M.D. Harv. Cambridge, Eng. Read before the Third International Dental Congress. Dr. Carlavau presented before the Société d'Odontologie of Paris, in June, 1898, a child, twelve years of age, whose mouth presented a series of abnormalities seldom met with in the same individual. In the superior maxilla six teeth had erupted; one was extracted and the others were of a completely conical shape. Also two molars of irregular shape were present. In the inferior maxilla two teeth of undefined form, which on account of their size were more of the nature of permanent than deciduous teeth, could also be seen. In the superior maxilla near the left molar a root was visible; also one in the inferior maxilla, in front of the right molar.

Dr. Carvalau thought that his case was one of total absence of the temporary teeth, but authors were inclined to doubt the correctness of the diagnosis. Fortunately they found in the museum of the Ecole Dentaire a cast of the superior maxilla taken by Dr. Sauvez, Sr., when this same patient was only two years of age. The two teeth that can be seen in this model are undoubtedly of the deciduous set, whether they be considered normal, abnormal, or supernumerary. Hence it is right to declare that the two cuspids in the adult jaw are the derivatives of the deciduous teeth which they

have replaced. These men argued as follows: "Considering the development of the maxilla and the size of the teeth, it can be seen that the replacement has taken place in an almost normal way. The material proof can be supported by physiological reasons derived from embryology. For the six front teeth and the bicuspids the development is carried out by the intermediary of the deciduous teeth. In fact, it is from a diverticulum of the enamel-organ of the deciduous tooth that the follicle of the corresponding permanent tooth is developed. If the deciduous teeth do not exist the permanent ones of the first series cannot develop. The molars whose presence we observe on the model cannot lessen the strength of this argument. We consider them to be the first molars, consequently derived from a direct invagination of the epithelium."

The cast of the superior maxilla of the case that I bring before you, taken when the patient was four years of age, not only supports the arguments referred to, but also justifies our stating that the deciduous teeth will be followed by permanent substitutes. Besides, as there are two temporary molars above and two below I am of the opinion that the upper root and the lower one in the first case indicate, as well as in my case, the preexistence of the four temporary molars, of which the two roots are the remains. The cast of the inferior maxilla is different from the one in the first case, and instead of two conical teeth, two temporary molars in their normal position are present. This would make us think that the root which persisted at twelve years indicates, as in the previous case, the preexistence of the two temporary molars.

The patient was born April 11, 1894. *Family History*—*Maternal side*: Great-grandmother: A space on either side in the position corresponding to the laterals. Grandmother: The four lower central incisors are absent; also the two upper lateral incisors. Absence of the third molars. The remaining teeth are normal. The same conditions characterized both dentitions. Aunt: The teeth are late to erupt. The upper and lower lateral incisors absent. The molars are imperfect. The same abnormalities occurred with both dentitions. The other aunts and uncles have good teeth. Mother: The upper lateral incisors are absent. *Paternal side*: The teeth are normal. Sisters: One aged three years has good teeth; another aged sixteen months has seven teeth.

The hair of the patient is very thin. Complete absence of eye-

brows. The skin is smooth, but very easily becomes freckled. During his early childhood he had gastric troubles, but at the age of a year he had developed enough to talk and walk. He cut his first tooth at eleven months and the second at a year. The first molar made its appearance at two years and a half. He did not like anyone to know that his teeth were unlike those of others. This is why he experiences so much comfort in wearing the artificial substitutes, which enable him to eat a greater variety of food.

Abnormalities.—I cannot record five different abnormalities, as Carlavau was able to do in his case. Those observed in the present case are the following: (1) Atrophy of nutrition; follicular atrophy. (2) Abnormality of number; *a*, decrease in number; *b*, increase in number, that is, if the front teeth are not considered as cuspids, but as supernumerary teeth. (3) Abnormalities of form, the front teeth being shaped like cuspid; the molars are almost normal.

History.—The mother brought the child to me when he was four years of age. Only four temporary molars and the two conically shaped teeth (rather than cuspids) in front in the maxilla. She had already consulted specialists in London, who were of the opinion that nothing could be done to improve the conditions present at that time. It is by no means surprising that the mother should have asked the two specialists the same question she asked me; if I could not give him something that would make his teeth grow. In spite of this I had to deal with a very intelligent mother.

At the first consultation I took the impression with great facility, considering the age of patient and small size of the mouth. I was so much encouraged that I advised the mother to allow me to make him a plate. I told her that I did not know of any calcareous preparation which could do him any good; that pressure and the friction of the plate might possibly have some effect, though I very much doubted it, and that if he would only wear the plates he would be able to perform all the functions belonging to the natural organs. I also informed her that by opening the bite we should improve his appearance, and that there was some possibility that through this procedure we might bring about development of the rami of the mandible. The mother and child were willing that I should do everything suggested. I first had his photograph taken, and then proceeded to make several plaster casts of his face, front and profile views.

I doubted so much that he would be able to wear the plates that the trial piece was made entirely of rubber, the teeth carved from white rubber. After a few days he became accustomed to it, and the result was so satisfactory that after a few weeks a plate was made with porcelain teeth. We had much difficulty in finding the right kind of teeth. For the central incisors we ground one tooth so as to get the effect of two. It was but natural that under these conditions we had to make some changes, and after one year we made him another plate and opened the bite a little more.

Result.—It is easy to see the result by comparing the photographs and casts of the face at four and a half years and at six. The good will of the patient in helping us to take impressions and to make casts of the face is still in evidence. It can be seen that besides the physical change a mental improvement has also been brought about. Formerly he would stay at home, but today he goes out and takes a prominent part in all the games and enjoys them just as other children do.

Prognosis.—This is the last radiograph of his head. The making of it has been a hard experience for him and a tiresome one for us. If you examine this carefully you will readily see the follicles of the permanent teeth which will follow the front teeth. Higher up can be seen the follicles between the roots of the molars, and also the first molars which will erupt within a short time. In a position corresponding to that of the second molars the presence of a darker spot makes us hope that these teeth will also erupt. In the inferior maxilla a different condition exists. Here no follicle can be seen between roots of molars; but he will have the first molars or the second. I am afraid the radiograph shows teeth of other side of mouth, and not the substitutes.—*Cosmos, Oct., 1901.*

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INTERSTITIAL GINGIVITIS AS A PROMINENT OBVIOUS EARLY SYMPTOM OF AUTOINTOXICATION AND DRUG POISONING. By E. S. Talbot, M.D., Chicago. Read before Chicago Medical Society, Feb. 13, 1901. As autointoxication implies self-poisoning, it logically follows that if any excretory organ fails to perform its function the other excretory organs must do its work. This is accomplished but very imperfectly. The sweat-glands perform their function normally in the summer, but with the first breath of cool weather the glands contract and the

liver and kidneys are forced to perform the work of the skin. Auto-intoxication takes place. The skin of the fingers begins to peel and itching with eruption results. Faulty elimination from the kidneys without disease of the organs will cause cardiac palpitation, headache, mental depression, dermatoses, rheumatism, gout, hysteria, epileptiform and exhaustional psychoses. Asthma, hay fever, adhesion of the lungs from pneumonia, undeveloped lungs and chest walls will cause blood impurities and skin eruptions from want of proper oxygenation of the blood. Faulty action of the liver, followed by constipation, results in sick headache, neurasthenia, drowsiness, skin eruptions, etc.

Dr. J. H. Salisbury includes under auto-intoxication all diseases and changes in the system by which poisons resulting therefrom are not eliminated. The more marked forms of auto-intoxication due to disease of the liver, bowels, kidneys, skin and lungs, and the poisons from drugs, such as mercury, lead, brass, potassium iodid, bromid, etc., are more obviously existent. In health auto-intoxication is never noticed until after the periods of growth are complete. Foods taken into the system are appropriated up to this this period. After the tissues have obtained the normal development, although the same quantity of food is taken, so much is not required by the tissues. The waste material is carried into the blood. The amount of food required depends upon waste and repair. This depends to a great extent upon the avocation of the person. The older the person, the more effete matter needs removal. The excretory organs are unable to do the work they did at thirty. The effete matter becomes a poison in the blood.

The alveolar process is not present at birth. It does not commence to form until the teeth begin to appear through the gums. It remains while the temporary teeth are present. When these teeth are lost the process absorbs, but it reappears on eruption of the permanent teeth. When these teeth are lost the process is again absorbed. The alveolar process simply holds the teeth in place while they are being used for mastication. The process is made up of cancellated bone tissue. Owing to the office it fulfills it is easily absorbed. It is therefore the most transitory and the most easily affected of any structure in the body. It might also be termed a terminal structure, because the arteries and nerves terminate in the bone and gum tissue. The mouth is a sensitive organ

and rapidly indicates disease. Children with stomach and bowel disturbances reflect such lesions on the gums and alveolar process. The tongue changes in color and the lips become black.

Absorption of the alveolar process is an inflammatory process. I have entitled this inflammation interstitial gingivitis. In interstitial gingivitis therefore the alveolar process as well as the gum tissue is involved. The inflammation, being interstitial in character, may be brought about by two methods, local and constitutional. Modern dentistry is doing most to produce local irritations resulting in predisposing causes; the application of the rubber-dam, clamps, wedging of teeth, correcting irregularities, sharp edges of decayed or filled teeth, crown and bridgework, artificial teeth, more particularly ill-fitting plates, overstimulation in the use of toothpicks, injuries, tartar, accumulation and decomposition of food, tobacco, and everything of a foreign nature that will produce irritation. The local causes which are easily recognized and can be handled only by a dentist, do not require discussion at this time.

The constitutional causes of interstitial gingivitis are autointoxication and drug poisoning. The autointoxication from pregnancy and change in climate have a most marked effect upon the alveolar process. The effect of changes of climate from a moderate temperature to extreme heat and to extreme cold, as well as high altitude, will produce the same result. This is noticeable in American soldiers in Cuba and the Philippines. The engineers and workmen on the Jungfrau Railway, two thousand six hundred meters above the sea level, suffer most intensely with this disease. The alveolar process, containing two or more teeth, becomes involved, resulting in acute inflammation throughout. The pain may consist of slight uneasiness ranging to the most severe pain. The teeth loosen and finally drop out.

Interstitial gingivitis may affect the alveolar process and gums of defective, rachitic, degenerate, and neuropathic children, or those who have had long illness. They are very susceptible to nervous impulses. People who have obtained their growth, that is, after thirty to thirty-five years of age, are the most susceptible and exhibit the most marked results from autointoxication and drug poisoning. The poison due to autointoxication and drugs circulates in the capillaries, setting up inflammation. This extends throughout the alveolar process and gums,

Interstitial gingivitis produces four forms of bone absorption—lacunar or osteoclast, haliteresis, Volkmann's perforating canal, and osteomalacia or senile absorption. Haliteresis and Volkmann's perforating canal absorption are naturally most common, since they are due directly to the inflammatory process and are likewise more rapid in their action. Lacunar or osteoclast absorption is nearly always present, but is slow. Osteomalacia or senile absorption is a natural process and attacks every individual sooner or later. Interstitial gingivitis is recognized by puffiness and bleeding of the gums. Absorption of the alveolar process causes a recession of the gums from the necks of the teeth, thus leaving the neck exposed. On account of the transitory nature of the alveolar process, if the inflammatory process be not arrested, the teeth will finally loosen and drop out. Pus infection frequently takes place. This occurs especially about the necks of teeth, and the resulting products are taken into the stomach, producing indigestion. Treatment consists in the patient's drinking eight or more glasses of pure water each day, in brushing the gums with a stiff tooth-brush three times a day, causing them to bleed, and the employment of proper mouth-washes. Tincture of iodine should be used upon the gums and alveolar process every other day until they are restored to health.

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CHLOROFORM AND AMYL NITRITE AS AN ANESTHETIC. Paul A. McIlhenny (*N. O. Med. and Surg. Jour.*) relates his experience with this combination while in the service of Prof. Senn in St. Joseph's Hospital, Chicago. At his suggestion a dram of amyl nitrite was added to a pound of chloroform and used as an anesthetic. It proved very satisfactory and was used in many cases, of which Dr. McIlhenny kept a record of thirty-eight. The nitrite of amyl acts as a decided "check-rein" to the chloroform, and especially so to its action on the circulation and respiration. It seems to modify the ill effects of chloroform without interfering with its anesthetic properties. The final combination consisted of five minims of amyl nitrite to the ounce of chloroform. The drop method was used in administering it. The stage of stimulation is much modified, the pulse being strong, full and not rapid; the face does not become flushed, as is often the case with chloroform; the breathing becomes slightly deeper than normal, but is not labored nor does it become rapid. The patient at first answers questions

promptly, but gradually answers more slowly, and soon becomes muddled; the stage of resistance is very short, and in a great many cases a slight stiffening of the muscle alone indicates any resistance whatsoever. The stage of depression is often absent, the heart regular and strong, the breathing deep and slow; if there is any depression it is very short; the patient going into a deep sleep which is easily controlled. The pupils respond very slowly to light, and the conjunctival reflex is also slow. To a person giving amyl nitrite with chloroform for the first time the pupils would be very misleading, as it requires close attention to notice their response to light. Vomiting is rare, and when it does occur lasts only a short time. As a general rule the patients go to sleep quickly without any struggling or hallucination. The shortest time required to produce anesthesia was six and the longest fourteen minutes. After the patient is asleep it is easy to keep him unconscious, requiring little of the anesthetic. The patient generally recovers consciousness very rapidly; in twenty minutes after the anesthetic has been stopped he will answer questions rationally. There is absolutely no headache nor fullness of head, such as we might expect.

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DISPROPORTIONATE DEVELOPMENT OF THE UPPER AND THE LOWER JAWS. A METHOD OF DETERMINING THEIR SUPRA OR SUBNORMALITY. By W. O. Talbot, D.D.S., Biloxi, Miss. Read before the American Society of Orthodontists at St. Louis, June 12, 1901. Among the most conspicuous deformities about the human face are those that are due to the disproportion in the size of the upper and the lower jaws. We have irregularities and malocclusions of the teeth, due to their several causes, and when such abnormalities are confined to the disarrangement of the teeth in their respective arches, or to the simple mesial or distal occlusion of the lower jaw, such disarrangement is scarcely noticeable by the casual observer except when the lips are separated. The average dentist may look upon such mouths with some degree of consideration, and picture in his mind the improvement in the expression of such persons with their teeth properly arranged in the arches and the arches correctly adjusted to each other. But that which appeals even to the casual observer, which calls forth deep consideration from the average dentist, and which actually grates upon the feelings of the esthetic who has studied and does

properly appreciate the harmony in facial expression, is the overdevelopment or lack of development of either the upper or the lower jaw. This condition is disfiguring and often becomes embarrassing to the patient, especially if it be the case of a young lady.

Every dentist who practices orthodontia at all has such cases presented to him for treatment. The most important step, as in all disorders, is a correct diagnosis, which must be reached if the treatment is to be successful. If there is a disproportion in the size of the jaws it is easily recognized by the orthodontist, and before placing an appliance or fully determining a course of treatment he must answer these questions in his own mind: "Is the upper jaw too small, or the lower jaw too large?" and vice versa: "How can this be determined accurately?" To answer these questions is the purpose of this paper.

Since it has long been known that the length of certain bones of the body bears a definite relation to the length of the whole body of man, it is reasonable to conclude that all the bones of a man's body bear some definite relation to each other in size and length. The variation from this definite proportion serves to give variety to the stature and form of man. In searching for some rule of proportion in the size of the upper and the lower jaws, together with the other bones of the face that have to do with the facial outline and give it expression, the writer, after having examined some twenty-five cases, including the three classes of malocclusion given by Dr. Angle, has reached the following conclusion: *Rules for Diagnosis*. First, when the teeth are in normal occlusion and the "line of harmony" (Dr. Angle) applies, there are three points of the face that are in the circumference of a circle described by the compass, with the condyle of the lower jaw as the center. These three points are the point of the chin, the tip of the nose, and the frontal eminence about one inch above the line of the eyebrows. Second, when the upper teeth are in a normal position and the jaw normally developed, the point between the cutting edge of the upper central incisors and the concavity of the nasal bones on the ridge of the nose (between the eyes) are equally distant from the condyle of the lower jaw, measured with the compass. Third, when measurement I applies and II does not the deformity is in the upper jaw. If overdevelopment, the point of the compass in measurement II will not reach the edge of the central incisors. If the upper jaw is not

sufficiently developed, allowing the teeth to crowd, the point of the compass will pass beyond the incisors. Fourth, when measurement II applies and I does not the deformity is in the lower jaw. If overdeveloped, when the point of the compass is placed on the point of the chin (the other on the condyle) and a circle described, the point will miss the nose and go high up on the forehead, and in extreme cases will pass over the forehead. If the lower jaw is subnormally developed the point of the compass when adjusted to touch the tip of the nose and the frontal eminence will pass over the chin. The conditions set forth in measurement IV might occur to a slight degree in a case of simple mesial or distal occlusion, but that could be easily determined by the regularity of the teeth in the arches.

In measurement I the condyle, the point of the chin, and the frontal eminence, where the arc of the circle strikes the latter, form an equilateral triangle. A special compass should be made for this work, with rounded points and a brace scaled with millimeters, by the use of which accurate measurements could be made and records kept.

The conclusions are not given as absolute measurements that apply to inanimate things, but as general rules that apply to that which is animate, subject to the variations of a human body that lives and grows according to its environments.—*Items, Oct., 1901.*

INTERESTING CASE.—By W. H. Arnold. On Jan. 15 of the present year a lady presented herself, seemingly in great distress, and not very sanguine over the diagnosis of prominent physicians and dental surgeons in regard to an edentulous inferior maxilla with which she was suffering very intensely. She was wearing a lower denture, the teeth having been extracted years before. My associate, Dr. S. J. Martin, was first to examine the jaw, and was told that at two different times professional brethren in a neighboring city had gone into the bone in the locality with engine burs and drills, attempting to remove what they pronounced to be either dead bone tissue or some sort of tumor. The soft tissue over the affected spot did not seem very sensitive, the only external and visible signs of any trouble being the cicatrix of a former operator's knife. Dr. Martin at once pronounced a piece of tooth to be causing the trouble, and insisted that he could remove it easily. The lady somewhat reluctantly allowed him to proceed, and after thoroughly obtunding the overlying gum tissue he used the lancet freely; then using a root-forcep loosened the apical third of a second bicuspid, and with the aid of an elevator it was removed. The good lady went her way rejoicing.—*Items.*

Letters.

RULE V OF THE ILLINOIS STATE BOARD.

CHICAGO, Dec. 16, 1901.

To the Editor of the Dental Digest,

MR. EDITOR:—I hand you herewith a copy of a letter which I sent to Dr. Pritchett, President of the Illinois State Board of Dental Examiners, and his reply. The latter states two things and nothing more. First, that because he has failed to find my name in the Official Report of 1900 he does not feel at liberty to discuss Rule V with me at this time. Second, that it may be better that he refer me to the attorney of the board, "upon whose advice Rule V was adopted." Failing in this, he advises me to try other members of the board.

Now, I maintain that it should have made no difference with Dr. Pritchett whether my name appeared in the Official Report of 1900 or not. The people interested in the rightful administration of the dental law of this state are not all mentioned in that report; there are several millions of them whose names you cannot find there. In this respect I think the Doctor intends to parry me, so as to avoid answering all my inquiries. The record of the board of which he is president was notice to him of my graduation from the Chicago College of Dental Surgery and of a license having been issued to me upon my diploma. This record is quite as official as any other.

He refers me to the attorney of the board, upon whose advice he says Rule V was adopted. Of course as to this I must take the Doctor's statement. But why did the board need advice upon this question? It certainly did not need any advice to follow the law and exclude all non-resident practitioners unless they produced a diploma or passed a satisfactory examination. Has the board ever obtained the opinion of the attorney general of the state, who is the only legitimate and proper advisor on such questions? If it has not done so, I suggest that the editor of the DIGEST do so, that the board may be fully advised of its error.

I have no apologies to make for placing this correspondence in your hands for publication, and I don't think Dr. Pritchett or any one else should complain. The members of the board are public

officers and this is a public matter. I know that I am right and that the board is wrong.

Respectfully,

C. E. WARNER, D.D.S.

CHICAGO, Dec. 10, 1901.

Dr. T. W. Pritchett, President of the Illinois State Board of Dental Examiners, Whitehall, Ill.

MY DEAR SIR:—I observe that the Illinois State Board has promulgated new rules governing the issuance of licenses to practice dentistry in this state. Although I have no personal acquaintance with you, my interest, in common with that of many other members of the profession, is such that I take the liberty of inquiring by what authority the state board purpose the issuance of licenses to persons coming into the state who shall have been for ten years prior to such time legal and lawful practicing dentists in the states from whence they came? I am led to make this inquiry from a reading of Rule V. I have always understood there were only two ways of obtaining a license to practice dentistry in Illinois—one by presenting a diploma from a regular dental college in good standing with the board, and the other by passing a successful examination before the board. I have heard that the old board in some instances issued licenses to practitioners from other states who had no diploma and who took no examination as provided by law; but the members "whipped the devil around the stump," as in the case of Dr. G. B. Haycock, where they pretended to examine his credentials, and called that an examination and gave him a license. But the state and the profession are rid of the old board, and it is hoped for the good of all, and I think it was generally believed when the new board was appointed some months ago, that we would be freed from the old board's methods. It is still to be hoped that we may, but Rule V does not encourage me to think we will be.

Now, I will state my objections to Rule V. First, the board has no power to make such a rule or to grant licenses as provided for by the rule. Second, it is a good thing for the profession that the law does not authorize you to issue licenses on such ground, because you have no power to take proofs or evidence. The proofs you may take are binding upon nobody but yourselves. You are given no power to administer oaths, and your own attorney will doubtless tell you that no one could be prosecuted for perjury for making a false statement to you or to the secretary of the board. Third, you

discriminate in favor of men who come from other states. If they are so well qualified to practice dentistry, why don't they take the examination and pass on their merits, and not attempt to credential themselves into the profession? You realize how easy it is for any one to get letters and testimonials as to both character and efficiency, when many times both are lacking, but you don't know it, and you take the applicant in and give him a license, when a dental college would not give him a diploma and your board would not pass him on an examination, and we dentists and his patients get the worst of it.

Take my own case for instance. Illinois is my native state. I have always lived and was educated here. It took me many years to prepare for the profession of dentistry. Two and one-half years were spent within the walls of the Chicago College of Dental Surgery before I could get my license from the state board to practice. The cost of my collegiate education alone was over twelve hundred dollars, and now, while I am just beginning in the profession, my collegiate education gives me a knowledge and training in modern dentistry that I dare say many of these credential candidates for a license never heard of, yet you purpose to license them and put them alongside of me in the profession. I say, and thousands of other dentists in Illinois will say with me, that this is not fair, and if it is not fair it is unfair, is it not? And an unfair thing cannot be right, can it? I greatly respect your honorable board, to whom the profession looks for a wise, capable and faithful administration of the Illinois Statutes. We are all in your keeping, and the great body of dentists are for the betterment of their profession, but we are opposed to Rule V. Can you tell me why any such rule was adopted?

Yours very truly,

C. E. WARNER, D.D.S.

WHITEHALL, ILL., Dec. 12, 1901.

C. E. Warner, D.D.S., Chicago, Ill.

MY DEAR DOCTOR:—Your esteemed favor of the 10th inst. is before me. Not finding your name in the Official Report of 1900 I hardly feel at liberty to discuss Rule V with you at this time.

As you express the opinion that Rule V is *illegal*, it may be better that I refer you to our attorney, Mr. Richard J. Cooney, 1319 Chamber of Commerce, Chicago, upon whose advice the rule

was adopted, and who will be pleased to discuss the peculiarities of our dental law with you. Failing in this, try our secretary, Dr. J. G. Reid, or Drs. Don M. Gallie and C. R. Rowley, all well versed in the law, I believe.

Respectfully,

T. W. PRITCHETT, Pres.

HOW THE BOSS REFORMED THINGS.

(As Told by the Office-Boy.)

One Evenin' after the Boss had been havin' a unusually Pestiferous Day Workin' at his Cheer, says he to me, "James, I've concluded there's got to be a Reform inaugurated about the Way things is Done in this Offis. I ain't Satisfied wuth a Cent. Things is too Slacktwisted."

I kind o' Blinked when he Said That, for I thought he Meant about me not Dustin' the Settin' Room for a Week, but he Went On right away, an' I seen it was Somethin' Else.

"I Find I let people Bully me too Much. It ain't a-goin' to Do, James. An' another Thing; Folks has got to Pay Quicker, or they Don't git no Work Done. They isn't a-goin' to be No More mixin' up of Business an' Sentiment. Do you think you Understand, James?"

The Boss begun to Cry when he Said That. He Gits thataway sometimes. They'd been Eight People come in on him while he was Operatin' for a New Patient that Afternoon, every one a-sayin' they was a Fillin' come Out. I've noticed the Boss kin Stand say about Five o' them Kind in a Afternoon, but Eight gits him Razzled.

"Yes, James, fourteen Years I've Spent in Dentistry, an' all them years I've been a kind o' Chinese Missionary Dentist, without Enjoyin' the usual Perquisites o' Missionaryin', sech as Comin' Home after a Long Five Years of Boardin' among the Heathen, an' havin' a Big Reception in the Church, an' Traipsin' up an' down in a Pulpit, Togged Out in Native Costume, showin' how the Miserable Heathen dresses, an' all the Ladies a-ketchin' their Breath, exclaimin' how Picturesque it is, an' Wishin' they was Missionaries. They ain't no Picturesque Features about Dentistry, James, don't you Forgit that. They ain't no Gittin' Up before a Sympathizin' Audience an' Tellin' how the Dentist's Wife was so Beautifully Self-Denyin' an' Patient, waitin' year after year, wishin' an' hopin' to See some Fruit of it all, an, So On—an' the Audience

dissolvin' in Tears, an' a Rousin' Collection bein' Took up. They ain't no Collections took up in Dentistry, James, exceptin' them that's Took Up from the Dentists themselves. In Dentistry you don't git much Applause, onless you Git Up in a Dental Convention an' 'Tarnally Lambast some other Dentist, or Read a Paper on some Subject nobody Don't Know nothin' about. In Short, James, the Highest Honors in Dentistry isn't no Great Shakes, the way I Look at it."

With that the Boss Bust Out a-blubberin' like a Child, an' Puffed a Whiff acrost Six Feet o' Space betwixt him an' it that almost Lit the Gas. Before proceedin' further he Went Over an' Wiped his Chin on the Mantel Throw.

"The Most I've got out o' Dentistry these Fourteen years is a Skimpy Livin' that ain't Paid For by about Seven Hundred Dolers, an' a Far-Reachin' Reputation for bein' Accommodatin' an' Reasonable in my Charges. People that ain't got no Money, an' that hasn't no Prospects for Gittin' Any, comes Confidin'ly to me to Git their Teeth Fixed. It's Offul Flatterin', James, but it ain't Fatenin'. My system seems to demand a Change, James. Hereafter I'm a-goin' to Onload them kind on young Dock Sangwin, around the Corner. He's jist Graduated at the Dental College, an' I've Heered he was Imbued with a Carload o' Lofty an' Elevatin' sentiments like the Sort that Prof. Flatry fired off at the Students of the Graduatin' Class at the Dental College, commencement night. As he Handed each Graduate his Diploma and a Fine Print Bible, he was Admonishin' them all about the Sacred Nature of their Callin', warnin' them how the Public had its Eye onto them, Watchin' Out to see that they didn't ever Lose their Self-Respect an' Violate the Code of Ethics, an' so on. He said they must Remember always to Perform the Same Kind o' Service for the Humblest (meanin' Servant Girls) as for the Ritch an' Mighty, always doin' their Level Best, without takin' No Account of the Pay, regardin' such Considerashuns as Base an' Onworthy, findin' their Highest Reward in the Consciousness of Faithful Service rendered the Patient.

"They was a Tremendous Outburst of Applause from the Audience, when he said that, James, an' nothin' would Do but he must say some More of the Same Kind. I Heered afterward, that the Rev. Mr. Credlus, that was Appointed to Deliver the Oration to the Graduates—which he addressed to the Audience—was so Impressed

with Prof. Flatry's grand an' Noble Sentiments, that he went the Very Next Day to his Office to Arrange about a Full Set of Teeth on Gold, but concluded to think it over, when he Found the Professor's Terms was Spot Cash in Advance. But as I was a-sayin' James, young Dock Sangwin seems to be Full of Enthusiasm an' the Missionary Sperit, and had Ought to be Encouraged. I'm A-goin' to Send him a Lot of the Raw Material, hereafter. You help me Remember, James."

"Yes Sir, I will," said I.

"If you jedge I ain't exactly Rememberin' James, jist you give me a Hunch. I won't Git Mad, James."

"All right, Sir, I'll do it," said I.

About a Week after this, one Mornin' in Come Mis' Walter. Richards, an' her Husband keeps Books for Smith & Dale, Tobacco Dealers, an' Another Woman was with her that was dressed Offul Wretched, like she'd Went an' Borried the Suit of Clothes from the Heroine in the Play, "Out in the Cold World." She acted like she was Afeard she hadn't Orter Come, but Mis' Richards made her be introduced to the Boss. Said She, "This Lady is my Cousin, Dock, an' she's got a Big Lot o' Work to be Done, an' she's Offul Poor, an' so I've brought her to you. Mr. Richards says you must Do the Work as Cheap as you Kin, an' the Best you Ever Do for Anybody, an' send him the Bill, an' he'll Pay it When he Kin."

The Boss he Smiled, an' Looked Offul Gratified, the Same as if it Was a Christmas Present of Texas Oil Stock. I Seen the time for Action had Come, an' No Mistake. I happened to be Outside washin' the Winder, an' Heered all this. Not havin' Time to Go Inside, I Reached through the Winder an' Give the Boss a Big Hunch with the Handle of my Mop. He Turned an' Looked, kind o' Supprised, an' Mis' Richards she Seen it too, an' she Looked Supprised.

"W'y James, what do you Mean!" said the Boss, an' I Seen he hadn't Took the Hint. But I wasn't a-goin' to be Bluffed, for I Remembered how I'd Went no less than Seven Times to Collect a Bill from that same Mr. Walter Richards an' he'd Always Say they was another Tooth to be Filled that the Boss had overlooked, or his Wife was a-comin' in, or somethin', an' Two Years had Passed without his Payin'. So says I, (lookin' kind o' Mysterious, so as the Boss would Ketch On), says I, "Don't you Remember what you

Told me to Remind you, the Other Day?" An' the Boss he Kind o' Flushed Up, an' says he, "James, you're not Employed to make Impertinent Suggestions about my Practice. Don't Let me hear any more impidence from you, Sir!"

So I didn't say No More, but thinks I, it's like what our Sunday School teacher was a-tellin' us last Time I went, 'way back in the Early Summer, jist before the Picnic—I mean, that about the Dog goin' Back to his own Vomit, an' the Hog to his Wallerin' in the Mire.

So the Boss he Set right to Work, 'cause they wasn't No Time to Lose, an' the Woman had to Ketch a Train without Fail, at Four o'clock, an' that didn't Leave only Five Hours to make Four Big gold Fillings, an' a Partial Plate. So the Boss he Put On the Dam, an' he Busted three Clamps tryin' them on a Wisdom Tooth, an' then when he Went to Burr out a Cavity the Burr tore a Hole in the Dam, an' he had to Begin all Over. So thinks I, hadn't I best Go In an' Help him? for I seen he was Gittin' Hot, an' no Tellin' what he Might Say, d'rectly. But Presently thinks I again, Let her Rip, let him Say it, if he wants to; no Great Loss if he Does drive her Away. But luck was agin me, for it So Happened that the Boss was in Onusual Perky Humor, that Mornin' (a check for Seven Dolers havin' Come by Mail), an' the Second Time he Got the Dam on an' All Fixed in About Fifteen minutes. The Teeth was Offul Sensitive, an' it wasn't no Picnic for the Boss, but he Got Done at Last, an' then he Took an impression an' Went On makin' the Plate, not Stoppin' for no Dinner. He jist Barely got Done in Time, an' says he, "James, that's the Last Person that springs that Ketchin'-a-Train business on me. They'll git their New Hats an' their New Cloaks, an' everything else they Need, all in Good Time; then they'll Come to me an' Want me to Cram a Day's Work into Four Hours. Mind you, James, this is the Very Last Time this Happens. Where's the Evenin' Post, James?"

I didn't answer Right Away, for it Wasn't Only about Five Minutes back that I'd Took In the Paper, an' I'n read Somethin' in it that was the Wuss Possible could have Happened jist at that Time, an' I was a-wonderin' how I'd ever Dare let the Boss read it. The Boss fussed around a Good Bit, huntin' for the Paper, an' it Seemed Like nothin' would do but he must Have It, although Giner'ly he Don't even Look at it. So after a While I pertended I'd jist found

it, but I Kep' Out the Page that I didn't want him to See. It was Like as If he was a Light Weight a-goin in the Ring agin a Champeen Heavy Weight, him a-tacklin' that Paper, I mean, 'cause he was Dead Sure to git it in the Neck, the minute he laid Eyes on that Paragraph. But it did Seem like nothin' would Do but he must Git it square in the Neck, for he said Right Away, "They's a Piece o' this Paper missin', James, git a Hustle on you an' Find it, Sir. You've simply Lost it; don't try any Nonsense on me, James."

So I had to give the Sheet up, an' I held it inside out a-purpose so he Wouldn't See, but he Turned it over with a Jerk, kind of impatient, an' then I, knowin' he was Up Agin it good an' hard, couldn't hardly keep from Yellin' at him to Lay Down an' Take nine seconds of the Count, for he'd Need all his Wind, the Comin' Round. But I didn't, an' so Up he Comes, an' as you might Say, before he could git his Guard Up, he Got it, Square on the Chin. There was a Quick Gasp an' a Grunt, an' with a Gurglin', Chokin' Sound he Slid Down in the Cheer an' Lay there, his Eyes Set an' Glassy. The Paper Slid to the Floor, an' there in Great Big Letters was the Headlines anybody could Read haf way acrost the Room:—

"Absconded! Walter Richards, bookkeeper for Smith & Dale, Wholesale Tobacco, Skips Out with Thirty Thousand Dolers of his Employers' Money! His Wife an' Several Children an' Others Dependent on him left in Destitute Circumstances. No Trace of the Defaulter. The Old Story:—Wine, Women, an' the Gamin' Table."

It took Ten Minutes of the Hardest Kind o' Kneadin' an' Gougin' at him, before me an' the Boy that Works next Door brung the Boss round. When he was Able to Set Up, He Looked Round, bein' still Wild an' Flighty Says he in a Faint Whisper, "What—what's happened, James—car jumped the Track—Biler Busted! Tell me Quick, James."

"'Tain't neither one," said I, "it's a Runaway. You ain't Hurt so Offul Bad. Lay Still."

FRANK W. SAGE.

Cincinnati, O.

FOR PROFIT TREAT SYMPTOMS; FOR REPUTATION, DISEASE.—The doctor who relieves a bellyache in fifteen minutes leaves a more favorable impression upon his patient than if he had steered the same patient through a four weeks' attack of typhoid fever.—*Dr. E. J. Melville.*

The Dental Digest.

PUBLISHED THE FIFTEENTH DAY OF EVERY MONTH

At 2231 Prairie Avenue, Chicago,

Where All Communications Should be Addressed.

Editorial.

THE DIFFERENCE BETWEEN CONDUCTING LAWSUITS IN COURT AND IN THE DENTAL JOURNALS.

In the November DIGEST we discussed very briefly the recent suit in New York between the Crown Company and the Protective Association. We knew that our readers were naturally anxious for information, and would expect us to go fully into the merits of the case. We therefore stated, "We have never tried these cases in the newspapers and journals, nor do we intend to do so in the present instance." If the fight were over we should have no objection to disclosing all our plans, but as we are just in the thick of the battle it would be most unwise for us to discuss the merits of the recent suit, as in so doing we should have to outline to a certain extent our future plan of action and line of defense.

In the December issue of the *Items of Interest* the editor of that publication has discussed fully the recent decision of the court. Our readers will probably expect us to reply to this editorial, but for the reasons above stated we must decline to be drawn into an argument at this time. When this litigation is over we promise our readers a detailed exposition of all the points involved. The editor of the *Items* advises his readers to join the Protective Association, if they have not already done so, and for his manifest good-will toward the Association and its following we unqualifiedly express our gratification. However, in justice to ourselves and our attorneys we must say that a careful reading of the editorial in question shows Dr. Ottolengui to be a better writer than he is a lawyer or logician. He has erred in his deductions, but we prefer not to dissect them just now.

Dr. Ottolengui further feels called upon to make what he terms "A personal explanation." In order that our readers may see same, we reproduce it in full herewith, as we wish to explain the "explanation."

"*A Personal Explanation.*—In view of the fact that in the past I have editorially been at variance with Dr. Crouse, to some it may seem inconsistent that the above editorial, advising our readers to support the Protective Association, should appear in our pages. An explanation, therefore, seems needful, lest the influence of ITEMS OF INTEREST, as a medium operating for the interests of the profession, may be injured. I have believed in the past, and I have openly declared in the past, that Dr. Crouse's conduct of the Crown Company suits has been based in error. I still believe, and I still declare, that an error has been made, and I say this in spite of what has been accomplished by the Protective Association. But may I ask here "What has been accomplished?" The answer in a single word would be, "Delay." Let us ask ourselves at this juncture, "For what have we been contending? Why did we join the Protective Association in the first instance? Was it to prove invalidity of one, or of two, or of ten patents? Or was it to establish the principle that the individual, manual work of the dentist should not be patentable?"

"If for the former reason, then we must admit that the Protective Association is nothing but a trades union fighting for self. If the latter, we have existed as an association of scientists fighting for the right of best, conserving the health of the mouths of our patients, and as such we have been fighting for the best interests of the community.

"How has the battle been waged? A regular patent lawyer was engaged, and whatever may be his ability, I maintain that he has injured rather than aided the cause we should have at heart. For years the contest has been against validity; the defense has been lack of invention, or priority of invention. In the end, as it exists at present, the decision is against us. A jury of laymen, men who are a part of that very community whose interests we should have been safe-guarding, have decided against the contention of the profession, against their own best interests, and in favor of the individual dentist and his little patent. By the very course pursued by Dr. Crouse and his patent advisor through all these years *it has been practically admitted that operations on the teeth are fit subjects for patent*, because they have never denied the principle, but have ever resisted the patent on the ground of priority or lack of invention. They did, however, in one instance find a judge who voluntarily declared that the tooth root, being an essential feature of the crowning combination, the whole combination was not subject of patent, as no part of a patented combination could be a portion of the human frame. Has any use been made of this decision, which was manifestly a step in the direction of our main contention?

"Why then, believing this, do I advise our readers to join the Protective Association? What else can they do? In unity there is

strength, and we must still fight on. Then again, common sense and common honesty bids me admit that even as I consider Dr. Crouse to be wrong, so must I admit that it may be myself that is in error. Dr. Crouse, by the advice of his attorneys, has followed a given line of attack so long that he cannot retreat. In the face of a temporary but serious defeat he must push ahead. He may win; I hope that he will, because a victory would probably discourage the formation of companies similar to the Crown Company for another century or more. And if the fight is to be waged, the dentists should stand shoulder to shoulder in support of the general in command, in this instance Dr. Crouse.

"On the other hand, I confess I would view with equanimity the court's support of the Hanks verdict. It might mean a loss of much money to the dentists of the country, but it would awaken them from the lethargy in which they have rested, lulled into an imaginary security upon the payment of a few dollars, and leaving all the work of the contest upon the shoulders of one self-sacrificing man. If Dr. Crouse has erred, all the members of the Protective Association are the real offenders. Since they have been content with his conduct of the case, they have indorsed it. Had we really been fighting for the great principle for which I contend we should have fought; had we been working to save teeth for our patrons, rather than to save dollars in the shape of royalties, we would long ago have asked Dr. Crouse to abandon the priority and lack of invention defense, and to try to establish the principle that the treatment of the diseases of the human body never was meant to be a subject matter of patent. The fact that our work is largely mechanical, has confused the minds of those in the patent office, and from this misconstruction of the real intent of the patent law the whole disaster has come upon us.

"Perhaps if Dr. Crouse should lose the Hanks case in the appellate court he might be awakened to the possibility of his having been in error, and in the next case fight on the line that a denture of any kind, made for an individual, and useful to no other individual; a product never in a single instance duplicated, is not a mechanical device in the patent office sense. Therefore, again I say, in spite of my differing from Dr. Crouse, I advise all not now members of the Protective Association to join at once.

R. OTTOLENGUI."

There are certain well intended comments in the above that are so impossible and apocryphal that we cannot remain quiet under the conclusion which the editor desires his readers to draw therefrom. He seems to think that we as chairman of the Association and our counsel in defending its members were sadly remiss because we did not stake our defenses in the trial of the cases in an effort

"to establish the principle that the individual manual work of the dentist should not be patentable," and generally to base the defense of the members upon grounds of the higher ethics of the profession.

There are two equally available and conclusive answers to this suggestion—First, the corporate organization of the Dental Protective Association provides that its sole object and power is to defend its members against suits brought upon patents believed to be invalid; Second, the ethics and high principles of the profession in regard to the "manual work of the dentist as a patentable subject matter" are solely a matter of Congress and legislation and not a matter of decision for the courts. The Federal Courts must apply the law as they find it. They cannot make laws nor can they give to statutes constructions which would negate the plain intention of the law. Manifestly it will be necessary before any dentist can be exempt from the infringement of a patent upon the principle "that the individual manual work of the dentist should not be patentable," that there be Congressional legislation to enact a law of this character. As we have before stated, we do not believe that Congress will ever so enact and thus protect any particular class by special legislation from the effect and application of the patent laws. We may in time educate our profession to that high standard, as the professions of medicine, of theology and of law have been so educated. No physician thinks of taking out a patent on a method or process to assure the prolongation of the vital forces, the mending of a broken limb or the cure of disease; no minister of the gospel takes out a patent on a method or process for the evangelization of the earth or the salvation of souls, and no lawyer resorts to the patent office for protection of a method in the preparation or trial of winning cases. We hope to see the day when the dental profession will reach that high standard; but until that day comes, to exempt the dentists of this country from the infringement of patents brought about by "manual work of the dentists," there must be Congressional acts of legislation specially singling out the members of the dental profession and favoring them.

Every dentist in the United States would today be under injunction from the Low Bridge patent, or have had his treasury looted to the extent of hundreds or thousands of dollars if Dr. Ottolengui's theory of defense had been resorted to or relied upon in the cases brought by the Crown Company.

The Supreme Court of the United States has decided that no part of the human anatomy can be used as one of the elements of a patentable combination, and a strenuous attempt was made by the Association to apply this doctrine to bridgework, but the majority opinions of the judges were that the invention of the Low patent and the process had been perfected and completed before or at the time of the application of the denture to the teeth, and that the teeth were not a part of the invention or a part of the process. The teeth were to be acted upon and not made a part of the invention.

If there is one class of citizens of this country which has power and influence with Congress it is the farmers, and for twenty years the farmers as a combined force have been urging Congress to suspend the application of the patent laws as against them as a class. Some twenty years ago thousands of farmers all over the United States were sued for having barbed wire fences, or having "driven wells" in their yards and fields, and for using harvesting machinery with patented parts. The farmers neither manufactured nor sold any of these appliances or devices, and had paid full value for all of them, yet were mulcted under the patent laws to the extent of millions of dollars by suits for using these patented devices. They made the same protest and defense as now desired by Dr. Ottolengui, namely, they attempted to establish the principle that the individual manual work and machines of work of the farmer should not be patentable. The defense was foolish and fruitless, so much so that Congress refused to recognize it, on the ground that it was class legislation.

Now, we have a practical suggestion to make to the editor of the *Items of Interest*, by which he can to a certain extent give effect, so far as New York State is concerned, to the condition he desires regarding the profession. The terror of every dentist in patent litigation is that he will be forced by judicial order to disclose and to describe all of the work that he does in the mouth of the patient alleged to infringe a patent, giving name and address. With sensitive men and women such a disclosure would mean the rupture of all relations between the dentist and his patient and would practically ruin his business in many instances. The State of New York has upon its books a special statute which exempts as "privileged" all relations between a physician or surgeon and his patient. Such physician or surgeon is not permitted to disclose

upon the witness-stand the work done and the services rendered by him to any patient. If Dr. Ottolengui can take up the work and have this New York statute extended so as to include dentists, he will have gone a long way practically towards bringing about a reform and result which he now proposes in a perfectly impractical way to put upon the Association. It will readily be seen that but a few suits will ever be brought against dentists for the infringement of patents for work done in the mouths of their patients if they are privileged and exempt from all communications, either by judicial investigations or otherwise, as to the character of such work.

Finally, we must say that Dr. Ottolengui's statement, that all that has been accomplished by the Dental Protective Association has been delay, is not only outrageously unjust, but is absolutely without foundation of fact. We should not speak so strongly about the matter if the editor of *Items of Interest* were ignorant of all the facts in the case, as his statement could then be attributed to ignorance. He claims, however, to know considerable about patent laws, and he is well aware of all that has been accomplished by the Association, consequently his action in attempting to belittle the work of the Association simply to make his own argument more plausible is beneath him. Fourteen years ago the International Tooth Crown Company had just begun operations, and had collected during the first year more than has been paid into the Protective Association since its organization. Other patent shark companies were also doing business. Fakirs were selling office rights, and the dentists of the country were fleeced and harrassed on all sides. Since the inception of the Association no member has been forced to pay royalty to the Crown Company or to any other vendor of illegal patents. The mountebanks who were selling office rights and methods of practice have ceased operations, and altogether the dental profession has been saved, at a conservative estimate, half a million dollars each year. Last but not least, a strong feeling of independence has been given to the dentists. When the Association was started the practitioners of this country were so broken in spirit by continued persecution that anyone could bulldoze them into giving up money on almost any pretext no matter how flimsy. The Goodyear Vulcanite Company, after the expiration of their patent, had just collected in the neighborhood of two million dollars, and had put in jail men who were unable to pay the damages demanded,

and the Crown Company would have had an easy time of it had not a concerted effort been made against them. The dentists of this country do not coincide in the statement made by the editor of the *Items of Interest*, that the Protective Association has accomplished nothing but delay, as he can very easily find out by inquiry.

Notices.

INDEX FOR VOLUME VII OF THE DIGEST.

The index for Volume VII of the DENTAL DIGEST will be mailed with the January, 1902, issue.

OHIO STATE DENTAL SOCIETY.

The thirty-sixth annual meeting of the Ohio State Dental Society was held at Columbus, Dec. 3-5, 1901, and the following officers were elected: Pres., Otto Arnold; 1st V.-P., J. B. Beauman; 2d V.-P., J. F. Stephan; Secy., S. D. Ruggles; Treas., C. I. Keely.

DISTRICT OF COLUMBIA DENTAL SOCIETY.

At the regular monthly meeting of this organization, held Nov. 19, 1901, the following officers were elected: Pres., J. H. London; V.-P., L. F. Davis; Rec. Secy., W. D. Monroe; Cor. Secy., Wms. Donnally; Treas., M. F. Finley; Librarian, H. B. Noble; Essayist, B. P. Bain.

SOUTH DAKOTA DENTAL EXAMINING BOARD.

A meeting of the South Dakota State Board of Dental Examiners for the examination of candidates will be held at Madison, January 8, 1902, at the office of Dr. F. N. Palmer, commencing promptly at 9 a. m. A practical demonstration will be required in every case whether applicant holds diploma or not, so it will be necessary to bring a complete operating outfit, including filling materials and engine, patient also if convenient. All temporary permits expire at this time, and those holding same must appear and obtain permanent license if they wish to continue practice.

G. W. COLLINS, Secy., Vermillion, S. D.

FIFTY-FIFTH ANNUAL MEETING OF THE PENNSYLVANIA ASSOCIATION OF DENTAL SURGEONS. ELECTION OF OFFICERS.

The fifty-fifth annual meeting of the Pennsylvania Association of Dental Surgeons was held Oct. 8, 1901. The following officers were elected for the ensuing year: Pres., Dr. Wilbur F. Litch; V.-P., Dr. Eben C. Flagg; Sec'y, Dr. J. Clarence Salvas; Treas. and Librarian, Dr. Wm H. Trueman.

The Pennsylvania Association of Dental Surgeons was organized at Philadelphia Dec. 16, 1845, and from that date to the present time has had a continuous existence. Dating back as it does to the early days, the dawn of

organized effort for professional advancement, it is a connecting link between the past and the present. The society is one of the very few that have been sustained, and is the oldest dental society in the world. Notwithstanding the fact that the organization of other local societies drew, from time to time, many of its more active members, it has nevertheless, continued to hold during this long period its regular stated meetings. The past year has been one of marked prosperity; there has been a large increase in membership and the meetings have been well attended, and have been made the medium for presenting papers of much practical usefulness to the profession, and hence having permanent value as contributions to current dental literature.

J. CLARENCE SALVAS, Sec'y.

LATEST DENTAL PATENTS.

- 684,481. Head-rest, M. C. Merker, Philadelphia.
- 684,844. Dental chair, M. C. Merker, Philadelphia.
- 684,981. Attachment for dental tools, W. C. Rothcranz, New York.
- 684,984. Dentist's tool, J. C. Graft, Newark, N. J.
- 685,659. Dental implement, G. M. Williams, Maysville, Ky.
- 686,613. Dental articulator, C. Huberty, Chicago.
- 687,316. Dental blowpipe and lamp, R. L. King, Pontiac, Ill.
- 687,987. Dental press, F. O. Jaques, Providence, R. I.
- 688,088. Dental chair, G. Holtz, Jamesburg, N. J.
- 688,122. Dental disk-mandrel, C. J. Reynolds, Pittsburg, Pa.
- 688,237. Dental forceps, J. B. Davis, Braxton, Miss.

News Summary.

CARL SOHENOK, a young dentist at Franklin, O., died Nov. 20, 1901.

W. J. BARRON, 70 years old, a dentist at Huntsville, Ala., died Dec. 9, 1901.

B. J. BULLEN, a dentist at Coalgate, Ark., died Nov. 9, 1901, from lock-jaw.

DENTISTRY ARTISTIC.—The dentist is an artist who makes drawings from life.

R. A. MARQUIS, a dentist at Brantford, Ont., died Dec. 8, 1901, from appendicitis.

HENRY D. HAWES, 33 years old, a dentist of New York City, died Nov. 30, 1901.

JOHN LUCKIE, 73 years old, a retired dentist of Mexico, Mo., died Nov. 27, 1901.

JESSE E. GROSHEIDER, 34 years old, a dentist at St. Louis, died Nov. 24, 1901, from lung trouble.

FRANK C. STREETT, 33 years old, a dentist at Baltimore, Md., died suddenly from heart failure Nov. 25, 1901.

FRANK L. MEARS, 28 years old, a dentist of Springfield, Mass., died Nov. 18, 1901, from typhoid fever.

WILLIAM H. CLARK, 35 years old, formerly a dentist at Red Wing, Minn., died at Phoenix, Ariz., Dec. 5, 1901.

EARLY START.—Dentist: "When did your teeth first begin to trouble you?" Victim: "When I was about one year old."

S. L. WARD, 78 years old, a dentist at Fairhaven, Vt., died Nov. 24, 1901. He practiced dentistry at Poultney for thirty years.

THOMAS S. EWING, 45 years old, and some years ago a dentist at Ann Arbor, Mich., died at Los Angeles, Cal., Dec. 8, 1901.

FIRE damaged the Cincinnati College of Dental Surgery Nov. 21 to the extent of about \$3,000. Loss fully covered by insurance.

HITT IN A VITAL PART.—Representative Hitt of Illinois was confined to his bed for several days last month by an abscessed tooth.

LAW OF COMPENSATION.—It is the man born with a silver spoon in his mouth who contributes most to the support of the dentist.

CAN'T DODGE FIRES.—A dentist at Assumption, Ill., by the name of Dodge, has been burned out three times in as many years. What's in a name?

CHARLES J. ESSIG, 74 years old, a retired dentist of Philadelphia, and one of the best known practitioners in that city, died suddenly from pneumonia Dec. 2, 1901.

DIGEST APPRECIATED ABROAD.—A recent number of one of the English dental journals contained two articles, one editorial, and one item taken from the DIGEST.

TOOTH AND NAIL.—A correspondent suggests that dentists and chiropodists were added to the U. S. Army so that the soldiers could go after the Filipinos "tooth and nail."

BEST DENTAL COLLEGE.—After all, the best dental college is the one that can take a raw green country boy and polish him up so that no one would think of calling him "Doc."

ROBBERIES.—Two more to report since last month. This time a dentist in Chicago lost \$200 and two dentists in Seattle lost \$60. The work was done by sneak-thieves in both instances.

CHARLES C. BARKER, 63 years old, a prominent dentist of Meriden, Conn., and one of the best known practitioners in New England, died suddenly from heart disease Nov. 30, 1901.

CHIVALROUS TO NO PURPOSE.—"Nothing makes a man feel so small," said the cynic, "as to hear feminine screams and upon rushing to the rescue to see the sign 'Painless Dentistry.'"

MARRIED.—Roy Case, Davenport, Ia., Dec. 4; John Dickson, Abbeville, S. C., Dec. 18; P. N. Foley, Paris, Ky., Nov. 24; Henry Leland, Lowell, Mass., Nov. 28; I. D. Lasher, Ft. Scott, Kan., Nov. 27; Daniel McClarty, Athens, Pa., Dec. 4; Thomas McCrum, Warren, Ind., Nov. 26; Albert Moss and Alma Kalthoff, Erie, Pa., Nov. 27; W. H. Neville, Seebree, Ky., Dec. 11; G. T. Sharpton, Edgefield, S. C., Nov. 16; E. M. Valentine, St. Paul Nov. 28.

OPENING FOR DENTISTS.—We do not refer to oral cavities, as might be supposed. According to newspaper report, the towns of Butler, Ky., and Lisbon Falls, Me., are in need of a dentist.

HEARTLESS.—She met him at the door all breathless with excitement. "John!" she cried "Baby has cut a tooth." "Poor little fellow," he replied commiseratingly, "is it a bad cut?"

QUONEHTACUT (CONN.) DENTAL CLUB elected the following officers at its meeting and banquet Dec. 11, 1901: Pres., J. T. Barker; V.-P., Henry McManus; Sec. and Treas., Charles McManus.

POOR SHOWING.—Fifteen candidates were recently examined by the Ohio State Board of Dental Examiners, but only three passed. This is the largest percentage of failures in the history of the Board.

VOICE SHOULD FOLLOW TEETH.—After listening for some time to the yells of a teething baby, the old bachelor remarked that it was a pity infants didn't get their teeth first and their voices afterward.

FRATERNAL DENTAL SOCIETY.—A society with this name was organized last month in St. Louis, with the following officers: Pres., W. J. Whipple; V.-P., W. E. Brown; Secy. G. H. Mathas; Treas., G. B. Winter.

SYRACUSE (N. Y.) DENTAL SOCIETY held its annual meeting Dec. 9, 1901, and elected the following officers: Pres., J. E. Cummings; V.-P., W. F. Engle; Secy. and Treas., A. M. Lafayette; Rec. Secy., C. J. Peters.

"COME BACK AND ALL WILL BE FORGIVEN."—"Dr. Bender, the eloping dentist, is badly wanted here and at the county seat, where many are now 'gumming it,' awaiting his return."—*West Lebanon (Ind.) Gazette*.

DENTISTRY POPULAR AT CHICAGO BRIDEWELL.—Free dentistry is being offered to the inmates of the House of Correction in Chicago, and strange to say, nine-tenths of the prisoners are anxious to have the work done.

MILWAUKEE DENTAL ASSOCIATION held its annual meeting and banquet this month and elected the following officers: Pres., A. Gropper; V.-P., W. S. Griffiths; Secy. and Treas., A. F. Kortebein; Member Board of Censors, J. J. Wright.

JEFFERSON COUNTY DENTAL SOCIETY held its seventh annual meeting at Watertown, N. Y., Dec. 9, 1901, and elected the following officers: Pres., R. F. Casler; V.-P., G. H. Seaver; Secy. and Treas., G. E. Coe; Ex. Com., F. P. Denny and G. R. Danforth.

JOHN HOMRIGHOUS, a dentist at Mattoon, Ill., committed suicide Dec. 5, 1901. He had been courting his cousin for twenty years, but fearing that they were not intended for each other, and that the \$8,000 which he had saved was not sufficient, he took his life.

CHARLES A. McGETTIGAN, 35 years old, a dentist at San Jose, Cal., died Dec. 7, 1901. Some years ago he accidentally swallowed a collar-button, which lodged in the lower part of his throat and could not be removed. About one year later he coughed it up, but various complications set in and finally caused his death.

SEASONABLE INQUIRY.—At a doctor's banquet in Germany somebody proposed the toast, "Long live our doctors." "What on?" asked a cadaverous looking specimen, rising from his seat.

S. J. GOODMANSON, formerly a dentist at Tiskilwa, Ill., and later at Pender, Neb., is reported to have been lynched in the state of Washington for the murder of his second wife. He was accused some time ago of murdering his first wife, but escaped punishment.

COMPLIMENTARY.—On the front of our subscription blank we give "Some reasons why we believe it would pay you to subscribe for the DENTAL DIGEST." Dr. E. C. Chase of St. Louis is kind enough to say that the main reason is "Because the DIGEST is the best journal published."

MEAT-PIE CAUSES DAMAGE SUIT.—A man in London, wearing an artificial set of teeth, recently broke two teeth off the plate by biting on a button that happened to be in a meat-pie which he was eating. He paid \$25 for a new set of teeth and sued the restaurant for \$50. The court allowed him the cost of the teeth.

THE MAID OF THE PERIOD.—

In vain does the penniless youth sing of love,
In a falsetto voice sweet and clear,
While the rich old man may chatter his vows
With a falsetto teeth—and she'll hear.

CARNEGIE'S AID SOLICITED—At the November meeting of the Central Dental Association of Northern New Jersey it was decided to ask Andrew Carnegie to aid in the endowment of an institution for microscopical, histological and bacteriological study of embryonic and organized teeth. A committee of five, members of the Association, was appointed to call upon him.

TEETH HELD FOR BOARD BILL.—An actor at Wallingford, Conn., owed a considerable board bill, so his landlady brought suit. The constable came to the actor's room after he had retired for the night, and had put his false teeth to soak in a tumbler of water. They were the only things of value that the constable could find in the room, so he levied on them. The actor has now brought suit to recover.

SULPHURIC ACID DECAYS TEETH.—According to newspaper report, the men who handle the storage batteries on electric cars are in a fair way to lose all their teeth. Sulphuric acid and water form the proportions of these batteries, and when charged with an electric current clouds of vapor arise which are strongly impregnated with sulphuric acid. No harm is done except to the teeth, but it is claimed that they completely decay in as short a time as three months.

PECULIAR CIVIL SUITS.—A dentist in Iowa recently sued a patient to recover a claim of \$23 for dental work. The defendant's attorney discovered that the dentist was not licensed, and was therefore violating the law when he did the work. On this showing the court decided against the dentist. A dentist in Ohio did some work for a woman in 1898, and she soon after separated from her husband, although no divorce was granted. Failing to collect

the money from her, the dentist is suing the husband, who claims that under the circumstances he is not responsible for the bill.

FATALITIES.—A seventeen-year-old girl in Chicago died from heart failure while on her way to a dentist's office. She had been dreading the ordeal for several days and the fear undoubtedly led to her death. A man, aged about 60, at Brockville, Ont., went to his dentist to have a tooth extracted. While the dentist was selecting a pair of forceps the old man died from heart failure. A man at Troy, Tex., had a tooth extracted last month, and immediately afterward heart trouble set in. Two doctors worked over him for several hours and finally brought him back to life.

ADVERTISING DODGES OF FAKIRS.—A dental parlor at Danville, Ill., offered a prize to the person who could write the name of the parlors the most times on a postal card. An individual is traveling through New York State with a vaudeville team. He hires a hall, and extracts teeth for half an hour and then the other vaudeville artists do their turn. A dentist at Lincoln, and another at Auburn, Neb., advertised to extract teeth free of charge one hour each day. One of them pulled thirty-eight the first two days and the other had a total of two hundred and twenty-eight at the end of a week. Verily, all the fools are not dead yet.

DENTIST'S PRESCRIPTION CAUSES TROUBLE.—A miner in Colorado was seriously injured in a mine last month, but the attending physician thought he would recover. During the night the patient suffered considerable pain, so sent a messenger to his physician. He was out, but his brother, a dentist, gave the messenger about fifteen grains of sodium bromid for the sufferer. This was administered, and three hours later the patient died. The dentist claims, and it is probably true, that the man died as the result of his injuries, but several local physicians claim otherwise. It is intimated that their zeal is due to their desire to punish the dentist for prescribing without a physician's license.

ACCIDENTS.—A dentist and his patient at Port Clinton, O., were severely injured recently by the explosion of a gas apparatus. The explosion of gasoline in the office of a dentist at Georgetown, Tex., caused a loss to him of \$1,000. While extracting a tooth a dentist at Bloomville, O., met with a peculiar accident. The forceps slipped off the tooth and struck him in the eye, making a serious wound. A dentist at Utica, N. Y., stood his vulcanizer on the family cook stove. The vulcanizer burst and smashed every thing in the room, including the stove. Live coals were scattered broadcast and the house took fire. Total loss \$250. A dentist at Livingston, Mont., was bending over a small gasoline stove when it exploded. He was thrown several feet and badly burned.

TOOTH SOME REVENGE.—A correspondent sends the following story—During the reign of Charles II, the age of gallantry, it was the custom among gentlemen, when drinking a lady's health, to destroy some part of their clothing, so as to do her still more honor. On one occasion a gallant had on a fine neckerchief, whereupon one of his friends, to play him a trick, drank to the health of a certain lady, at the same time throwing his neckwear in the fire,

and the other gallant had to follow suit. A few nights later the victim of the joke was suffering from toothache, so he went to the tavern where his friends were at supper, taking with him a dentist. He drank the health of a fair lady, at the same time ordering the dentist to pull out the aching tooth, so the joker and all the company had to submit to the same operation.

HEMORRHAGIC BULLA OF THE MOUTH AND PHARYNX.—J. Preston Maxwell says that in the whole region of Fokien, Southern China, there exists a curious disease, consisting of a large bulla in the mouth which bursts and discharges dark blood. The pathology is obscure. The Chinese universally attribute it to the web of a peculiar fly-catching spider. In several instances patients have affirmed that they saw the spider jump out from their basin of condiments, and, taking a piece from that place, have been immediately victimized. Unfortunately, the efforts of the writer to reproduce the condition artificially in animals and man has been a failure. The affection may come on while eating rice, sugar, soft biscuits, drinking tea, or merely lounging about. The prognosis is good, and the treatment is simple, as a tannic acid gargle quickly stops the bleeding.—*Medical Record*.

ETHYL BROMID A PRIMARY ANESTHETIC BEFORE THE USE OF ETHER OR CHLOROFORM.—Dr. Emery Marvel's method had been for the anesthetizer to enclose a piece of gauze in the palm of the hand and pour upon the gauze one fluid dram of ethyl bromid, exceptionally a larger quantity. The patient was usually unconscious in forty to forty-five seconds, and then either chloroform or ether was substituted. Full anesthesia was usually induced in about three minutes. By this method excitement, coughing, and excessive bronchial secretion had been avoided. No unfavorable action on the heart or on respiration had been observed. The tendency to vomit after chloroform or ether could be reduced but not altogether removed by the prior use of ethyl bromid. The author stated that the advantage of this method when chloroform was employed was slight, but it was very marked when ether was used.—*Med. Record*.

WOMAN DISPELS FEAR.—A New York dentist, who makes a specialty of extraction, reports that he formerly had men assistants, but they gave him considerable trouble. One poured gas into a patient who nearly choked to death before he could explain that he could not take an anesthetic; another resigned after an athletic victim had thrown him through the window, and a third removed the hood prematurely, whereupon the subject arose in a fit of gas intoxication and wrecked the office, the assistant and the dentist before they could get him under control. Worst of all, these men did not exert a soothing influence on nervous patients, so the dentist hired a plucky, capable, good-looking girl. Male patients who formerly had to be dragged into the office and who tried to climb out of the window before they would submit to the anesthetic, are now meek as lambs, as no man likes to show himself a coward before a good-looking woman.

RUST REMOVED FROM SURGICAL INSTRUMENTS.—If the instruments are badly rusted, your best plan will be to send them to a cutler or instrument maker and let him regrind and polish. If only superficially attacked, the

following will answer admirably: Potassium cyanid, 16 parts; chalk, levigated, 30 parts; soap, shaved, 15 parts; water, sufficient. Dissolve the soap in sufficient water to make, with the chalk, a thick paste, in which incorporate the cyanid. With this paste rub the blades well until the rust disappears and a polished surface is attained. The operation is rendered more rapid if the blades or other objects be soaked in kerosene over night and the surface rust scraped off with anything that will not scratch the blades. Do not forget the deadly nature of the scouring paste, and take proper precaution to protect the hands. Use an old stiff toothbrush in applying the paste. —*Pract. Druggist.*

LUXATIONS OF THE LOWER JAW WHICH CANNOT BE REPLACED—Kramer. As treatment for those rare dislocations of the lower jaw which cannot be replaced, modern surgery, in the text-books and periodicals, recommends only the removal of the condyloid process of the inferior maxilla, but Kramer says that this should only be done as the last resort. He reports a case treated two years ago, in a girl of 20, in whom he simply divided the masseter and pterygoid muscles, not opening the joint at all. This dislocation had existed for five weeks. After the skin had been incised and the muscles divided, the lower jaw was easily replaced, the muscles sutured, and the wound closed. In two weeks she could open her mouth 2 cm., and since then she has wholly recovered. If this should not be successful, then the condyloid process of the inferior maxillary bone should be removed. —*Centralblatt fuer Chirurgie.*

REMOVAL OF FISH-BONES FROM THE THROAT.—Max Breitung (*Munch. Med. Woch.*) reports the case of a man who came to him for relief three days after having swallowed a fish-bone. The throat was considerably swollen, there was difficulty in swallowing, and the patient complained of pain on the right side near the thyroid cartilage. No sign of a foreign body could be detected with or without the laryngoscope. Breitung introduced his finger, and after feeling about found a sharp point on the surface of the right tonsil. Upon illumination a small white speck could be seen, which might easily have been taken for a little mucus. With forceps the piece of bone was withdrawn. The author believes the palpation is an important adjunct in finding sharp foreign bodies in the throat. The sensation of the patient is only of value as to the side in which the foreign body is located; complaint is generally made of its presence much deeper than it usually is.

"THE MAKERS OF DENTISTRY."—A paper entitled "The Makers of Dentistry" was read by Charles McManus, D.D.S., before the Hartford Dental Society, September 3, dealing with the history of dentistry and illustrated with lantern-slide portraits of over seventy five celebrated American and European dentists. Among the number were A. Pare, Pierre Fauchard, John Hunter, Joseph Lemaire, James Gardette, John Greenwood, Paul Revere, John Randall, Leonard Koecker, Horace H. Hayden, Chapin A. Harris, Horace Wells, John M. Riggs, G. Q. Colton, Sir John Tomes, Sir Edwin Saunders, Thomas W. Evans, Elisha Townsend, S. P. Cutler, Edward Maynard, Jas. Taylor, Amos Westcott, Joseph Richardson, E. J. Dunning,

Thos. B. Gunning, Asa Hill, R. W. Varney, S. C. Barnum, Marshall H. Webb, J. B. Morrison, B. J. Bing, W. H. Dwinelle, W. H. Atkinson, W. W. Allport, W. G. Bonwill, J. H. McQuillen, Thomas W. Parsons, S. S. White, J. E. Garretson, W. Herbst, W. H. Morgan, H. J. McKellops, Frank Abbott, Geo. H. Cushing, Emile Magitot, Charles S. Tomes, W. D. Miller, and many other well-known dentists who have contributed to the making of modern dental surgery.

CARELESS AS BOLD.—The story of a remarkable surgical operation is told in a Danish medical periodical, in the treatment of a patient who had become asphyxiated from the administration of chloroform. The patient struggled, and when the process of anesthesia was carried further he stopped breathing. Several expedients were resorted to in order to restore respiration, but in vain. There was no longer any pulse. In this emergency Dr. Maag opened the chest, detached portions of the third and fourth ribs two and a half inches long, and turned them back with a flap of flesh. Through the opening thus made he thrust his hand. The heart was firmly grasped and compressed rhythmically. After a few squeezes that organ began to beat naturally. It was necessary to employ compression again at times, and also to inflate the lungs artificially. By these means the patient was kept alive for eleven hours and a half, and Dr. Maag is inclined to believe that the man would have recovered were it not that the pleura was accidentally punctured.—*Modern Med. Sci.*

EXTIRPATION OF THE GASSERIAN GANGLION.—Prof. Krause (*Munch. Med. Woch.*) reports twenty-seven patients treated for excruciating trigeminal neuralgia. Several have suffered for over twenty years, but all have been cured without having a trace of neuralgia since. The first cases were operated on in 1893. The author ligates the middle meningeal artery, which takes but a few seconds, to avoid complications. The time required for the operation depends greatly upon the amount of hemorrhage; one operation lasted three hours. The average time was one and one-quarter hours. By scarifying the bone about fifteen minutes is saved. Three patients died—one in a few hours from shock, an old debilitated woman, and one with chronic nephritis. To prevent paralysis of the lower lid Krause cuts parallel with the fibers of the facial nerve. The cornea is protected for a few weeks. Neuralgic pains have occurred in several on the other side, but on the side of the operation the only complaints have been twitching and itching.

REMOVAL OF FOREIGN BODIES FROM AIR PASSAGES.—In the removal of foreign bodies from the air passages De Forest Willard says that coughing should be encouraged and forcible inspiration restrained. Inversion in the prone position as a domestic practice is advisable. Laryngoscopy is helpful if the body is lodged at the vocal cords. It may be extracted by forceps or by laryngotomy. If time permits the *x*-ray may be brought into serviceable use for diagnosis. Careful diagnostic investigation is important to determine the actual presence of an impacted body and its location.

Tracheotomy under local anesthesia should be the rule if the object is lodged at the bifurcation or in the bronchi. Tracheoscopy, suction and for-

ceps manipulation must be cautiously employed. Prolonged instrumentation adds greatly to the danger of pneumonia. If extraction is not secured through the tracheotomy wound, the chest wall should not be invaded unless an artificial respiratory apparatus like the Fell-O'Dwyer is at hand, and oxygen available. With the assistance of these appliances, however, the bronchus may be reached, anteriorly or posteriorly, since by their use rhythmical movements can be maintained. Resultant abscess of the lungs should be treated by incision and drainage.—*Jour. A. M. A.*

CURIOUS SYMPTOMS AFTER ADMINISTRATION OF NITROUS OXID.—A. Stanley Green administered gas to a man of twenty-six years, using Barth's inhaler and allowing plenty of air. Complete anesthesia was easily produced and four teeth were extracted. A few minutes after recovering consciousness the patient complained of numbness in hands, legs and feet. The hands were pronated, the fingers slightly flexed, and the thumbs strongly adducted. Rubbing caused pain. Respirations became rapid and accompanied by sighing and then stridor. The pulse was 84, the color was good. The patient was excessively restless and unable to articulate. The symptoms gradually subsided and after an hour's rest the patient was sufficiently recovered to return home. He was not at all of an hysterical temperament. The author has administered gas more than 1,000 times during the past three years and has never before met with such a case.—*Med. Record.*

EMPHYEMA OF THE ANTRUM OF HIGHMORE IN YOUNG INFANTS.—In the *Medical Record* Dr. Emil Mayer reports a case of empyema of the antrum of Highmore in an infant of two and a half years. Although some have held that cases similar to that reported are not true cases of empyema, but rather cases of caries, osteomyelitis, periostitis, etc., the author takes issue with them. He quotes Lenox Browne who maintains that the maxillary sinus appears during the fourth fetal month; the ethmoidal at the seventh; the sphenoidal at the third year of life; the frontal at the seventh; that the maxillary antrum is well defined although small at birth and undergoes little change until the second dentition, from which date it develops rapidly. A review of the literature shows that it is affected quite often in acute infectious diseases of childhood. Streptococci, staphylococci, Klebs-Loeffler bacilli and pneumococci are among the organisms that have been found there *post mortem*. The author thinks it possible that infection of the antrum may explain the persistence of the bacillus of diphtheria in the nose in some cases. Among other causes are mentioned dental affections, coryza, acute and chronic rhinitis, tonsillitis, pharyngitis and foreign bodies. According to Mayer there may be a secondary infection in typhoid fever, acute rheumatism, suppurative processes in other parts of the body, typhus fever, pneumonia and variella. That empyema of the antrum does occur in young infants the author considers established beyond question. "That so few cases are noted in the living is probably due to the fact that the mortality is greatest when this complication occurs, and also that in the very young the presence of localized pain is difficult to establish. In all reported cases the symptoms are the same, namely, fistula under the eye usually discharging pus, ectropion, one-sided purulent discharge from the nose with foul odor, and eroded bone."—*Pediatrics.*

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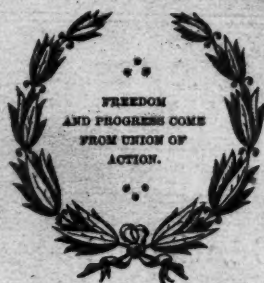
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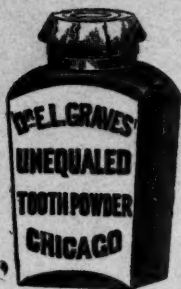
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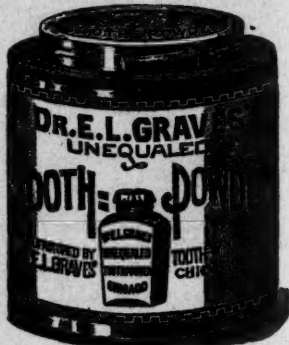
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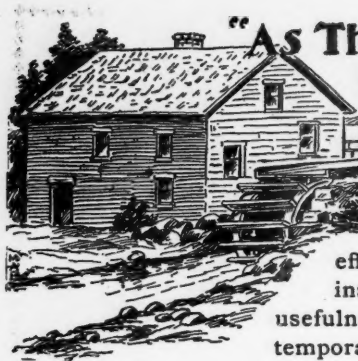
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Dental Protective Supply Co.

1101 Champlain Building, Chicago.

Branch 818 Real Estate Building, Philadelphia.

Please mention the Dental Digest when writing to advertisers.



"As The Mill Cannot Grind With The Water That Is Past"

so you cannot work effectively with dull burs and instruments, whose edges and usefulness are past. Send in all the temporarily disabled ones and let us renew them.

Hereafter our prices on repair work will be as follows: Our present high standard of workmanship will be maintained. The price only is lowered. We guarantee satisfaction or your money back.

**Cavity Burs, Recut
and Stoned.**

PER DOZ.

50c

In six dozen lots 45c
In twelve dozen lots 40c

Price per Dozen.

Finishing Burs, recut and stoned **\$1.00**
Excavators Repointed 75c to **1.00**
Pluggers Reserrated **1.50**

Nickel-Plating Done at Reasonable Rates.

Being manufacturers of handpieces, we are equipped to make a specialty of Handpiece Repairing.

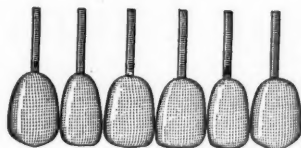
The Dental Protective Supply Co.

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Branch 818 Real Estate Building, Philadelphia.

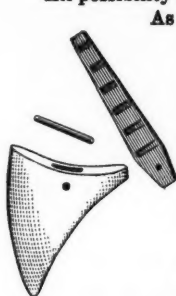
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"Fellowship" Crowns at Fellowship Price



In devising this crown we have overcome one radical defect possessed by most others. Nearly all other makers secure the pin in the crown by screwing it in, or by setting it with cement, gutta-percha, etc. The result is, that sufficient anchorage is lacking and very frequently the pin turns in the crown, ruining the work.

All possibility of such a mishap has been avoided in the "Fellowship."



As will be seen from the cuts, a small metal pin goes through a hole in one side of the crown, through one end of upright pin, and half way into other side of tooth. Porcelain body is then placed over exposed end of small pin, and in crown cavity, and baked, after which there is no possibility of anything working loose.

The pin is made of composition metal and is as pliable as platinum.



The crown is made from the same body as our "Fellowship" teeth, whose strength is well-known. Finally, the price is right. Why pay 60 cents for a crown when you can buy one just as good for 25 cents less?

	PRICE,	35 cents each	
✽	In \$10.00 lots, 30	" "	✽
	In 25.00 " 25	" "	

The Dental Protective Supply Co.

1101 Champlain Building, CHICAGO.

BRANCH 818 Real Estate Building, PHILADELPHIA.

Please mention the Dental Digest when writing to advertisers.

Four Points

wherein our "FELLOWSHIP" slip-joint is superior to all others:



First—It is universal and will fit any handpiece.



Second—The locking device is simplicity itself and there is no cumbersome catch to hinder and annoy you.



Third—It is cheaper. Price complete (parts A, B, C), \$6.50. Extra Sheath (A), 75 cents. Extra dog (C), 25 cents.



Fourth—It will last a lifetime, as the wear can be taken up. All other slip-joints might as well be thrown away when they start to wobble, but in ours the wear can be taken up. Notice the cone bearings at D, a feature possessed by ours alone.

DENTAL PROTECTIVE SUPPLY CO.

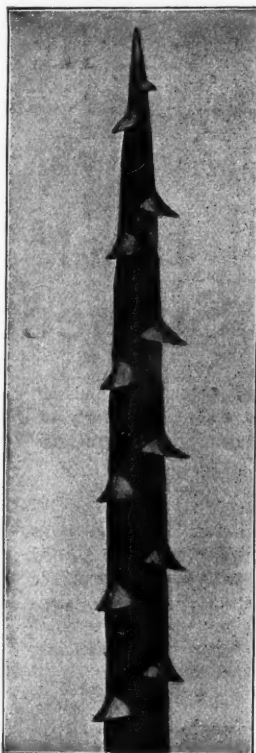
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CHICAGO.

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"Fellowship" Nerve Broaches.

FELLOWSHIP



BROACH.

This cut is made from a micro-photograph of a "Fellowship" Broach, showing it enlarged about twenty-five times.

"Fellowship" Broaches are made from the finest spring-tempered steel and are barbed on three sides only, which makes them stronger and less liable to break than the Donaldson and similar broaches, which are barbed on four sides.

"Fellowship" Broaches are made by skilled workmen and every instrument is tested before leaving the factory.

"Fellowship" Broaches were the first of superior quality offered the dental profession at a reasonable price, and are now, as then, the peers of any broaches at any price.

Any supply house can make a fair profit retailing broaches at \$1.00 per dozen. We suggest that you ask the Trust houses why they have charged outrageous prices all these years.

"Fellowship" Broaches are put up in five styles—extra fine, fine, medium, coarse, assorted—and they sell for \$1.00 per dozen, \$5.50 per half gross, \$10.00 per gross.

Since we have made it possible for you to buy broaches at a reasonable figure, do we not merit your trade in this line? Insist on having "Fellowship" Broaches. If your dealer can't or won't supply you, send to us.

Dental Protective Supply Co.

1101-4 Champlain Bldg., Chicago.

Branch 818 Real Estate Building, Philadelphia.

Please mention the Dental Digest when writing to advertisers.



A Little Light on a Dark Subject

The subject of "easy-working, slow-setting and plastic" alloys is a very dark one, for most of them are utterly unfit for use. We have, however, lightened the gloom with

"DUCTILE" ALLOY,

as in it we have satisfied the demand for a cheap yet reliable alloy. "DUCTILE" amalgamates readily and works easily, sets slowly, does not shrink and retains a good color. We guarantee it to be superior to all other plastic alloys, and can heartily recommend its use to practitioners seeking this kind of a filling material. "DUCTILE" is not so good as "FELLOWSHIP," but is better than any other \$1.50 or \$2.00 alloy yet offered for sale.

PRICE:

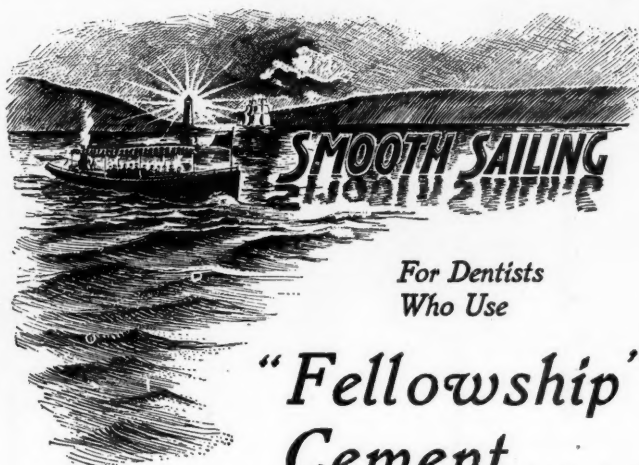
1 ounce	1.50	5 ounces.....	7.00
10 ounces.....	13.00	20 ounces.....	24.00

Dental Protective Supply Co.

1101 Champlain Bldg., CHICAGO.

Branch 818 Real Estate Bldg., Philadelphia.

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*For Dentists
Who Use*

"Fellowship" Cement

FELLOWSHIP CEMENT is the result of years of experimentation and is as great an innovation in the cement field as was "Fellowship" Alloy in the alloy field.

FELLOWSHIP CEMENT is quick setting.

FELLOWSHIP CEMENT is impervious.

FELLOWSHIP CEMENT is non shrinking.

FELLOWSHIP CEMENT is non-expanding.

FELLOWSHIP CEMENT is insoluble and can be used for permanent fillings, etc.

FELLOWSHIP CEMENT is non-irritating and is an ideal material for setting crowns and bridges.

FELLOWSHIP CEMENT *is good for anything that any dental cement is good for.*

Price, per box, \$1.00; six boxes, \$5.00.

Dental Protective Supply Co.,
1101-4 Champlain Building, - - CHICAGO.
Branch 818 Real Estate Bldg., Philadelphia.

Please mention the Dental Digest when writing to advertisers.



Guaranteed Mouth Mirrors.

Perhaps no other instrument is used more constantly than the Mouth Mirror. It is therefore necessary that this instrument should be always of the very best workmanship. Two or three points of superiority distinguish our product from the general run. In the first place, the glass for the lenses is selected with great care. Our Mirrors are mounted carefully in their frames, and so far as possible they are aseptic.

Instead of the old-time way of cutting a thread upon the handle, rendering the mirror extremely delicate at the point of greatest strain, our mirrors have a stiff, metal rod inserted in their handles. That's why our Mirrors never break. Finally, the price is lower than those of inferior make.

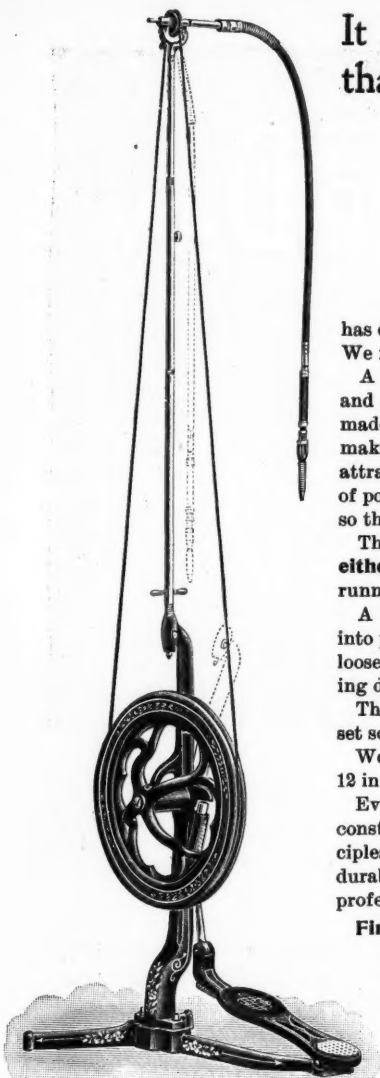
Nos. 1 to 6, Plain or Magnifying, 65c each
White or Black Handles.....

DENTAL PROTECTIVE SUPPLY CO.

1101-3 Champlain Building - - - CHICAGO

Branch 818 Real Estate Bldg., Philadelphia.

Please mention the Dental Digest when writing to advertisers.



PAT. OCT. 12, 1895

It Is Not An Accident
that the ❀ ❀

“Fellowship” Engine

has every engine virtue and no engine faults.
We make it so.

A new lot of 500 has just been completed, and in them a few improvements have been made, such as the dish-shaped wheel, etc., making this engine the most artistic and attractive in appearance of any. All points of possible weakness have been strengthened, so that breakage is almost impossible.

The drop pulley head has long bearings on **either side** of the wheel, which insure steady running and equal wear at all points.

A slight upward toss of the arm raises it into position, and pressure on the thumb-piece loosens it. This is the most convenient locking device on the market.

The standard can be raised or lowered by set screw.

Weight of driving wheel, 13 lbs.; diameter 12 in.

Every feature of the “Fellowship” engine is constructed upon correct mechanical principles, and it is the easiest running and most durable article of the kind yet offered to the profession.

Finally, the price is lower than that asked for inferior engines. We offer the “Fellowship” equipped with our universal handpiece, 14 instruments, oil can, flexible sleeve and engine arm support for

\$37.00

Dental Protective Supply Co.

1101 Champlain Building, Chicago.

BRANCH, 818 REAL ESTATE BLDG., PHILADELPHIA.

Please mention the Dental Digest when writing to advertisers.

RUBBER DAM

Medium Or Thin,
Smooth Or Corrugated.

PRICE \$1.00

PER ROLL.

Thin , Medium, Corrugated (Medium), 6 inches wide, 5 ounces to roll	\$1.00
Same, 7½ ounces to roll (1 yard)	1.50
Heavy , 6 inches wide, 7½ ounces to roll	1.50

Compare these weights with what you are now getting. As for the quality, we will guarantee all dam sold by us.

Dental Protective Supply Co.

1101 Champlain Building, CHICAGO.

Branch at 141 N. 11th St., Philadelphia.

Please mention the Dental Digest when writing to advertisers.

"FELLOWSHIP" HANDPIECE.

Price \$10.00.



The special features of our Handpiece are double end chuck, improved locking device, and long, efficient bearings.

Ample provision has been made for taking up all wear, and we guarantee that if the bearing surfaces are kept clean and well oiled, this Handpiece will last for years, and prove the best that has ever been placed upon the market.

It is adapted to hold different forms of bit shanks (except cone journal) which can be inserted or taken out from the Handpiece while the engine is in motion. It can be attached to any Dental Engine, and will fit all ordinary right angle attachments.

Owing to the entire absence of screws, the Handpiece can be taken apart without the use of wrench or screw-driver and is so constructed that escape of oil upon the hand of the operator—an objectionable feature in some Handpieces—is entirely avoided.

In ordering our "Fellowship" give all necessary particulars as to style of your engine and attachments.

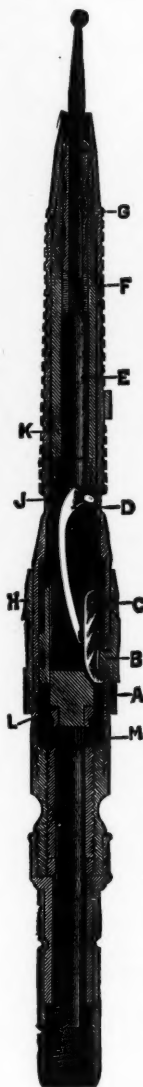
DIRECTIONS FOR USE.

To fasten bur in handpiece—Push the sleeve H forward (which opens the split chuck G); insert the bur in spindle and draw back the sleeve H as far as it will go.

To oil handpiece—Unscrew the milled nut A (giving it about 4 turns), take out B, and then remove the sheath. Lubricate at back bearing L and at coned portion of spindle for forward bearing and also on sliding collar C. Screw sheath back on collar, replace B in its seat on H (being very careful to see that the small lug on B engages in the groove of C) and screw milled nut A back in place.

To take up wear by tightening chuck—When because of wear bur is not held tightly, remove outside sleeve H and unscrew the sheath. By taking hold of front spindle K, where it is flat, and placing flat in slot of back spindle J, you can easily unscrew the two spindles. Take out the plunger E, and on small end place a copper washer. Assemble the handpiece, and if bur is not held tightly enough, remove parts as before and add another washer.

To attach handpiece to any engine arm—Push forward sliding sleeve H and place instrument in slot to hold spindle at back of handpiece from turning. Then screw driving spring in flexible wrist on to spindle by turning to left, and fasten flexible sleeve to handpiece.



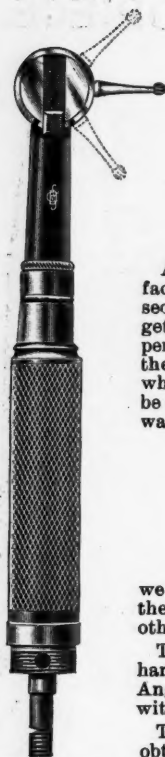
Dental Protective Supply Co.

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THE PROBLEM SOLVED.



Handpiece.



Attachment.



At present angular handpieces are not satisfactory; first, because the price is too high, and second, because they are continually breaking or getting out of order, thus causing frequent expense and trouble. The trouble has come from the fact that the proper combination of gears, which would give all the required angles and yet be strong enough to withstand the great strain, was not found. In our new

"Fellowship" Angle Attachment and Angular Handpiece

we have solved the problem, and now guarantee them to require less repair and to outwear any others on the market.

The Angle can be attached to our "Fellowship" handpiece, or to the "No. 6" or "No. 7"; and the Angular Handpiece can be used with our own or with any standard of slip-joint.

The bur can be held at either an acute, right or obtuse angle, thus giving all positions desirable or possible.

The Angle Attachment which we put out some time ago was designed to take the "No. 2" right angle burs, but in some cases considerable difficulty was caused by the fact that the different makes of burs varied in size of both fit and shank, thus interfering with the delicate mechanism of the gears.

We have therefore made the present instruments to take a bur with groove in shank by which it is held. If you have a stock of "No. 2" angle or of Davis burs on hand, we will, **without charge**, fit them to our Angle.

PRICES:

Angle Attachment,	-	-	\$7.00
Angular Handpiece,	-	-	7.50
Burs, per dozen,	-	-	1.00

Dental Protective Supply Co.

1101 Champlain Building, Chicago.

BRANCH 818 REAL ESTATE BLDG., PHILADELPHIA.

Please mention the Dental Digest when writing to advertisers.



We Have Awakened

the dental profession to the fact that a thoroughly reliable alloy is possible. Before we put out "FELLOWSHIP" in 1897 there was not an alloy on the market fit to put into the mouth. The alloy manufacturers did not care to incur the trouble and expense necessary to produce a reliable

article, and the dentists had no redress except to give up the use of amalgam, which many of them did. "FELLOWSHIP," however, revolutionized this field of dental labor, and "FELLOWSHIP" QUALITY IS TO-DAY THE STANDARD BY WHICH ALL OTHER ALLOYS ARE MEASURED. Let us show a few causes why our product to-day stands at the top.

It never shrinks, but always expands $\frac{1}{1000}$ to $\frac{1}{10000}$ of an inch.

It does not blacken the hand nor discolor in the mouth.

It possesses remarkable edge strength, and resists several times the pressure under stress and flow of any other alloy.

It sets rather quickly and becomes very hard in a short time, so the filling can be finished at one sitting.

Last, and perhaps most important, it is always uniform, as Dr. J. N. Crouse personally tests every lot and guarantees it to be perfect before we offer it for sale.

We were the first manufacturers who tried to give you an honest article, and "FELLOWSHIP" was the first tested alloy ever put on the market. Despite the attempts of our numerous imitators it to-day stands without a rival. Our highest aim is to always keep it at the top, and you need have no fear of its quality ever deteriorating.

IMPORTANT Any dealer who offers you "FELLOWSHIP" at one cent less than our prices is trying to palm off some spurious imitation, for every dealer is under contract not to cut the price. Beware of imitations, as we make the only "FELLOWSHIP" alloy, and it is never sold except under our name.

PRICE: { \$3.00 per ounce. \$22.50 per 10 ounces.
12.50 per 5 ounces. 40.00 per 20 ounces.

DENTAL PROTECTIVE SUPPLY CO.

1101 Champlain Bldg., Chicago.

Branch 818 Real Estate Bldg, Philadelphia.

Please mention the Dental Digest when writing to advertisers.

"FELLOWSHIP" TWIST BROACHES

Fellowship TWIST BROACHES
have no barbs.

Fellowship TWIST BROACHES
are unbreakable.

Fellowship TWIST BROACHES
can be tied in a knot.

Fellowship TWIST BROACHES
are made of toughest steel known.

Fellowship TWIST BROACHES
are made to go into smaller canal than
any barbed broach.

Fellowship TWIST BROACHES
are the best made.

Fellowship TWIST BROACHES
are the cheapest.

Fellowship TWIST BROACHES
are made in the following sizes:
Fine, Medium, Coarse, Assorted.

PRICES

Per Package, (1-2 dozen) . . .	\$ 0.50
Per Dozen	1.00
Per Six Dozen	5.50
Per Gross	10.00

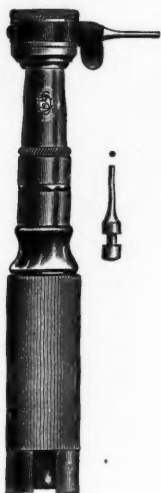
MANUFACTURED ONLY BY

Dental Protective Supply Co.

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Branch at 818 Real Estate Building, Philadelphia

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"FELLOWSHIP"

Right Angle Mallet

Invented by DR. S. G. PERRY, New York

This mallet is one of the simplest, strongest and most attractive instruments **for packing gold** ever offered to the dental profession. The bearings are long and efficient, the hammer having bearings on either side. The plugger points are inserted without the use of special pliers or long tapers, and it merely requires a slight pressure on the spring to release the point.

The **rapidity** of blow is regulated by the speed of the engine, and every revolution of the handpiece gives a blow.

The **force** of blow is regulated by the pressure brought to bear on the tooth.

The mallet can be attached to any handpiece.

Price of Right Angle Mallet, \$6 00

Price per set of six plugger points (assorted), \$2.00.

Dental Protective Supply Co.

1101-1104 CHAMPLAIN BUILDING, CHICAGO.

Branch at 818 Real Estate Building, Philadelphia.

Please mention the Dental Digest when writing to advertisers.

Made for us by the largest firm of gold beaters in the world.

*Used and endorsed by the most conscientious and
successful gold workers in the profession.*

"Fellowship" Gold Foil and Cylinders



"Fellowship" Plain and Corrugated Cylinders

SOFT AND COHESIVE	Per $\frac{1}{8}$ ounce.....	\$ 4.00
	Per $\frac{1}{4}$ ounce.....	15.00
	Per ounce.....	29.00
	Two ounces at one time; per ounce.....	28.00

Each box of plain cylinders is labeled showing the proportion of a sheet of foil contained in each cylinder.

"Fellowship" Gold Foil

Per $\frac{1}{8}$ ounce.....	\$ 3.50
Per ounce.....	27.00

CASH MUST ACCOMPANY ALL ORDERS.

Dental Protective Supply Co.

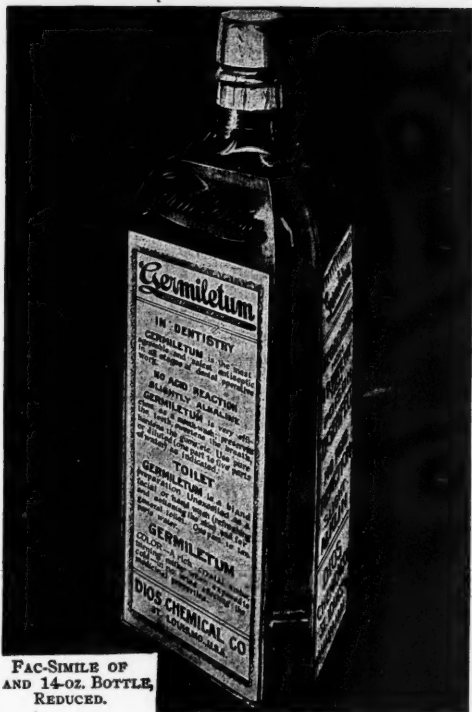
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Germiletum

OPPOSED TO GERM LIFE



FAC-SIMILE OF
3 AND 14-oz. BOTTLE,
REDUCED.

Germiletum THE PERFECT DENTAL ANTISEPTIC AND DISINFECTANT, WITHOUT ACID REACTION, SLIGHTLY ALKALINE. A Chemical Solution of Borohydrofluoric Acid, Borosallybenzoic Acid, Boroglycerine, Formaldehyde with Potassium Permanganate, Menthol, Thymol and Antiseptic Aromatics. Put up in the Most Elegant Prism-Shaped 3-oz. and 14-oz. Bottles. Indicated in all Dental Operative Work Wherever an Antiseptic or Disinfectant is Required. The Most Satisfactory Commendation is an Impartial Trial. Booklet giving full information mailed free on application. Large size (14-oz.) bottle free to dentists, they paying express charges.

DIOS CHEMICAL COMPANY, ST. LOUIS, MO.

Please mention the Dental Digest when writing to advertisers.

Austin's Dental Specialties

Linen Finishing Strips—Highest Grade.

The linen used in the above strips is imported from Ireland and is especially adapted, being very thin and tough. These strips are evenly and thickly coated, cut evenly and packed with care. They are made in all widths and grits, in the following styles:

**Carborundum, Corundum, Garnet,
Cuttle-Fish, Crocus.**

**Price,
Per box, 50c.**

We make a specialty of Coarse Strips. No other makers turn out Strips with grits as coarse as ours.

Cloth Finishing Strips—A Superior Grade.

These strips are designed to meet the demand for a good, cheap article. They are made in all widths and grits, but only in the following styles:

**Carborundum, Sand,
Cuttle-Fish.**

**Price,
Per Box, 30c.**

When ordering, do not confuse the above two grades. Our 50c. grade is superior to any other strips on the market at any price. Our 30c. grade is superior to any sold at less than 50c. and equal to or better than many sold at that price.

DISKS Our disks are all made of the best materials obtainable. They are cut one at a time, thus insuring perfect edges. Sizes: $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$. They are made in all grits and in the following styles:

**Carborundum, Garnet, Sand,
Emery, Crocus, Cuttle-Fish.**

**Price, per box, \$.10
Per dozen, 1.00**

Flexible Rubber Plate Finisher

For use with lathe; does away with scrapers and files. This handy appliance consists of a flexible rubber chuck covered with emery cloth, which can be changed in an instant. It conforms to shape of plate, and there is no danger of wearing plates through as with rigid trimmers. Saves time and temper. Price, **50c**

Lathe Wheel Dresser

The only thing except a diamond which will dress a carborundum wheel round. Makes old wheels better than new, increases utility of new ones. A great money saver. Price, **\$1.00**

Chisel and Scaler Sharpener

For use with handpiece. Gives perfect bevel and edge almost instantly. Price, **50c.**

All goods guaranteed to be the best of their kind on the market. If not entirely satisfactory they may be exchanged or money will be refunded, at purchaser's option.

For Sale by **DENTAL PROTECTIVE SUPPLY CO.**

and all first-class Dental Depots. If your dealer cannot or will not supply you, order direct.

ROBERT AUSTIN

MANUFACTURER

836 Walnut Street.

CHICAGO, ILL.

Please mention the Dental Digest when writing to advertisers.

Chronic Ulcers and Abscesses. Resolution produced at once.
Dr. Charles Patrick Brown's Antiseptic (D.P.M.) NON TOXIC.

In tubes for immediate use.

Especially serviceable in PYORRHEA, FISTULOUS ABSCESSSES, and in SUPPURATIVE conditions generally. REVOLUTIONIZING treatment of ABSCESSSED TEETH. Surgeons CURE TUBERCULAE ABSCESS with D. P. M.

A valuable specific for the treatment of Abscessed teeth, Putrescent pulps and Chronic Alveolar Abscesses. Applied to *old indolent ulcers and gangrenous conditions* it changes the foul ichorous pus into that of a laudable character, and is *sufficiently stimulating* to induce them to heal.

TESTIMONIALS.

DR. C. P. BROWN, Seattle, Wash.

SEATTLE, WASH., September 5, 1900.
 Judging from my limited experience with your D. P. M., I can recommend it very highly. I have been specially successful in treating blind abscesses, which of course demonstrates its merit without the test of time. I feel it almost indispensable in my practice. D. I. BURKHART.

DR. C. P. BROWN, Seattle, Wash.

SEATTLE, WASH., Feb. 27, 1901.
 Having used your D. P. M. for some time, I desire to call your attention to the excellent results which I have obtained in its use. I wish particularly to speak of the success with which I have met in the treatment of abscesses and putrescent pulps. I find that chronic alveolar abscesses with fistulous opening respond readily to the treatment and the short time in which resolution is produced is certainly very pleasing. As a dressing for teeth with dead or putrescent pulps it is excellent. I regard the D. P. M. as indispensable in my practice and can recommend it to the Dental profession. G. N. KIMBALL, D.D.S.

D. P. M. PRICES \$1.00 AND \$2.00 PER TUBE

REMITTANCES—Express Order, Postal or Currency. If Currency, letter must be registered. Address orders to Dental Depots or

DR. CHARLES PATRICK BROWN, Seattle, Wash.

For sale by **DENTAL PROTECTIVE SUPPLY CO.**



FOR

**Sterilizing the Mouth,
Teeth and Tongue.**

Bad Breath.

Removing Bad Taste of Medicines.

THE MOUTH should have careful and constant attention to counteract the ill effects of prepared foods. Animals living on raw foods do not have diseased gums, decayed teeth, or indigestion. "Vegetol" dentifrice cleanses without injury, and by frequent use restores the saliva to a protective alkaline state, like that of animals.

Send for sample, also booklet on the subject, containing formula.

THE VEGETOL COMPANY,

SOLD BY DRUGGISTS.

11 E. Seventh St., CINCINNATI, O.

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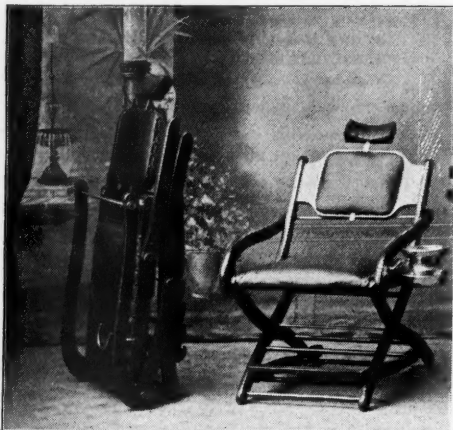
Duncan's Adjustable Folding Dental and Physicians' Chair

Especially adapted for Extracting Teeth and for Second Chair in Office.

Has adjustable back and head rest. Range of seat, 18 to 30 inches. Made of oak, finely finished. Seat, head rest and back upholstered in maroon leather. Nickel cuspidor. Adjustable attachment. It is fitted with stirrups and is especially useful to Physicians in Gynecological Work and for general examinations in office.

PRICE, COMPLETE
\$18.00.

Can be procured of all first-class dealers, or address,



DR. H. E. DUNCAN, - Spring Valley, Minn.

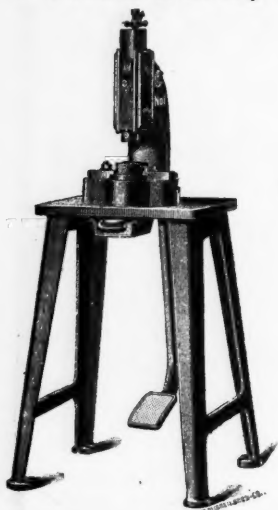
PRESSES, DIES AND TOOLS

For working sheet metal of every description.

SPECIAL MACHINERY
BUILT, FINE MODEL
MAKING AND EXPERIMENTAL WORK.

Send samples or sketch for prices. Ask questions on dies and stampings.

AMERICAN HARDWARE MFG. CO.
OTTAWA, ILL.



Sample of Stampings done on No. 1 Foot Press.

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Looking for Extra Values in Second Hand Engines?

Let us send you prices and description
of several bargains we have on hand.

Dental Protective Supply Co.,
1101-3 Champlain Building,
CHICAGO.

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Quickly secured. **OUR FEE DUE WHEN PATENT
OBTAINED.** Send model, sketch or photo with
description for free report as to patentability. **48-PAGE
HAND-BOOK FREE.** Contains references and full
information. **WRITE FOR COPY OF OUR SPECIAL
OFFER.** It is the most liberal proposition ever made by
a patent attorney, and **EVERY INVENTOR SHOULD
READ IT** before applying for patent. Address:

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The Philadelphia Optical College
INCORPORATED  C. H. Brown, M. D.
Prof.

1022 Walnut Street, Philadelphia, Pa.

To Dentists in the smaller cities and towns,
Our suggestions will open a new and attract-
ive field, which can be cultivated with pleas-
ure and profit. The ultimate aim of all is to
make as good a living as possible, and there
is no doubt

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would prove a profitable investment. On ac-
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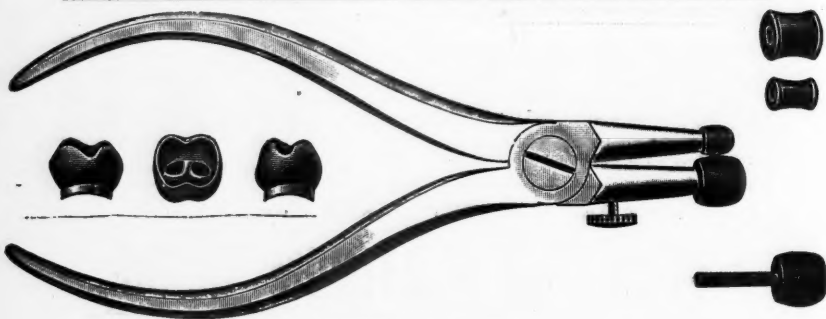
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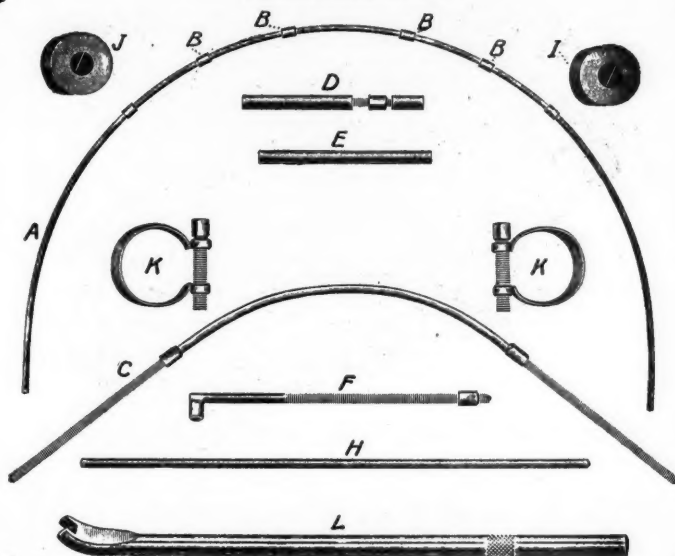
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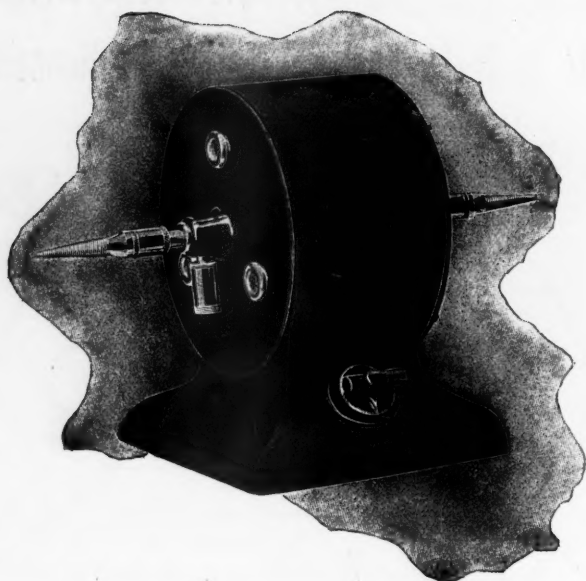
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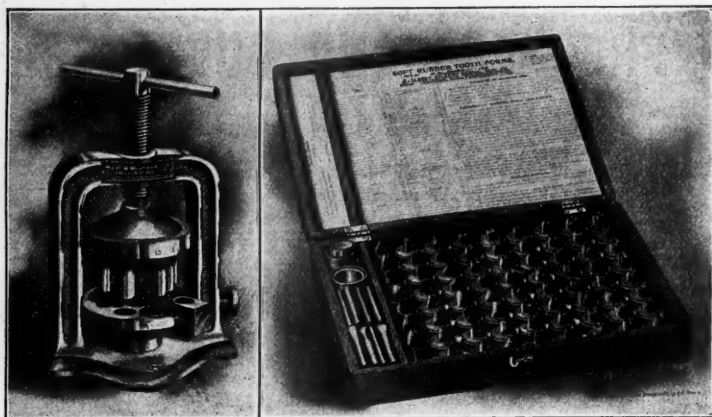
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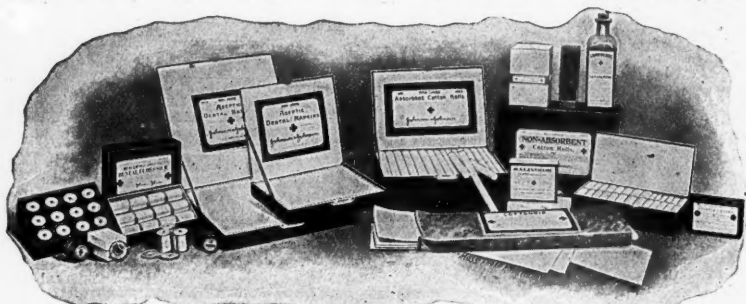
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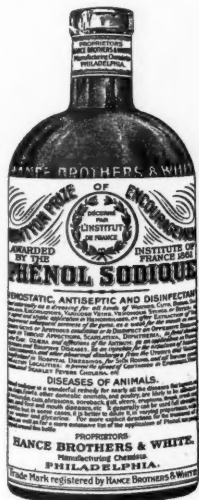
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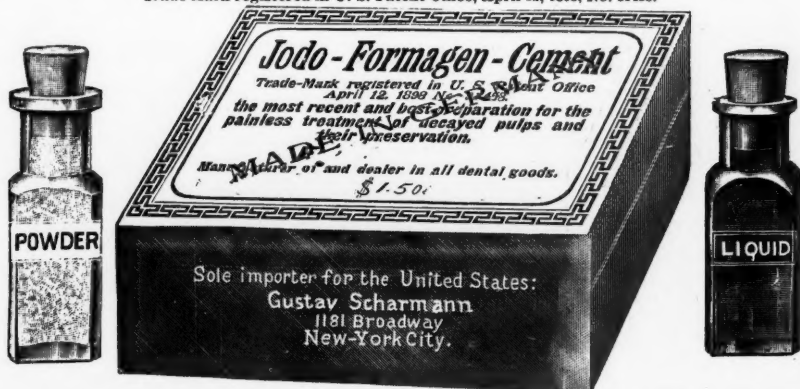
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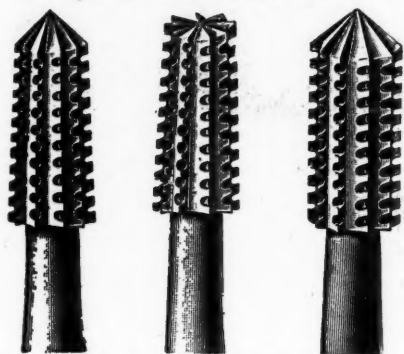
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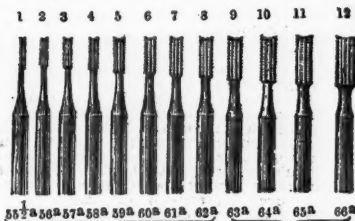
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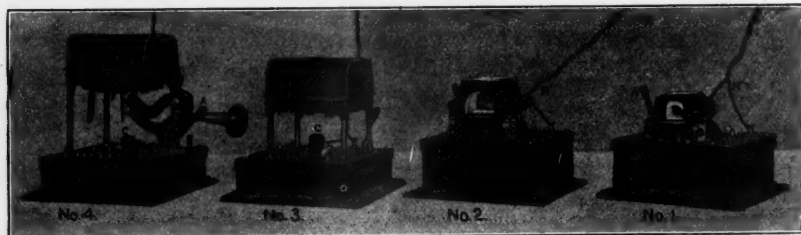
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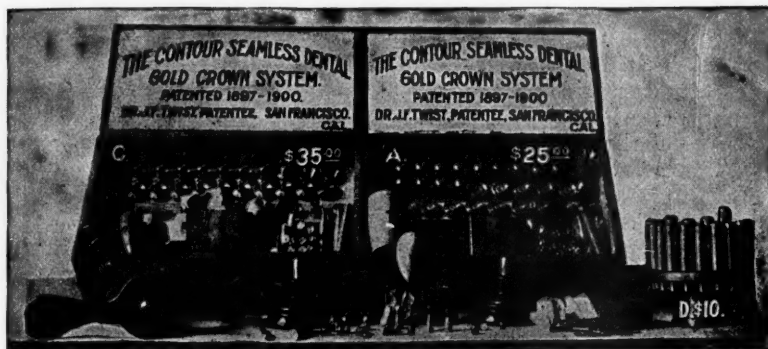
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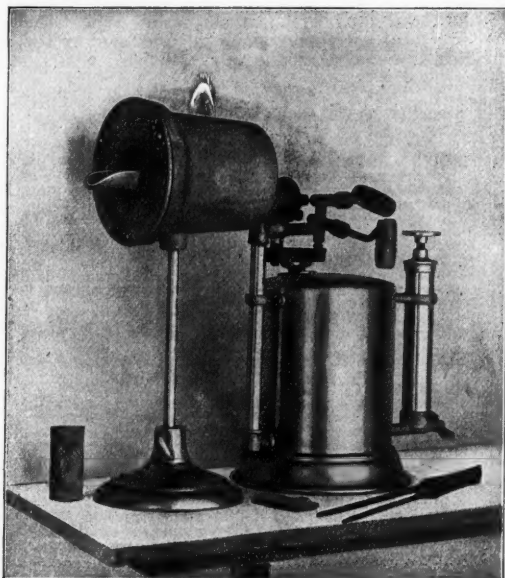
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"You can't say too much for that Blow Pipe."

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Complete 21.00

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BALTIMORE COLLEGE DENTAL SURGERY.

BALTIMORE, January 23, 1900.

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The Base Plate is the color of the natural gums, and is especially adapted for making temporary sets WITHOUT VULCANIZING.

Will not crack or break under any ordinary conditions, even if dropped upon the floor.

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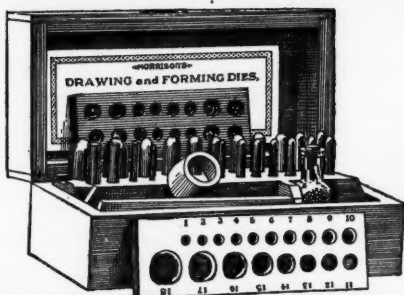
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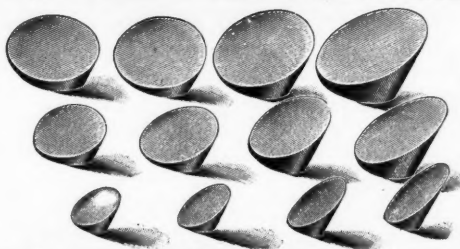
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Just as good as 22kt.
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Blanks can be used to fill in
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They are made in 3 gauges and
4 different lengths to each
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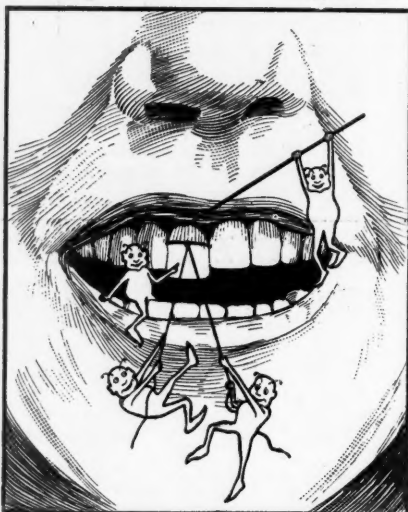
Yet YOU have had them come OUT of the roots like THIS; YOU have had to HOLD them in place until the cement SET; perhaps YOU have not stopped to think WHY they came OUT; YOU may think those LITTLE FELLOWS pull them out; but it is AIR which forms a CUSHION and forces them out; do you think AIR is a good FILLING MATERIAL? why will YOU do your work that WAY when a perfect filling is put in with a CRUTTENDEN CEMENT SYRINGE; with IT there is no AIR in the root, no coming out of the crown, no holding the crown, no guess work about it.

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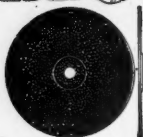
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These disks are made thin and flexible, about the same in thickness as paper disks, but more durable; having a hard rubber backing, which admits of more pressure and rapid cutting.

The grit with which these disks are made is the celebrated new abrasive CARBORUNDUM, which is noted for its remarkable hardness and keen cutting qualities.

We have added to our line of disks an EXTRA THIN rubber disk that is as flexible as the usual paper ones, and being waterproof, will last ten times as long as paper, thus saving the time of the operator that is wasted in changing disks.

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Is a new grinding wheel for dressing off the rough surplus rubber, just after removing the plate from the vulcanizer. Cuts very fast, much superior to files or scrapers. It is made of numerous layers of emery paper, which may be removed one at a time when worn out, exposing a fresh layer for further use. Two sizes, 1 and 1½ inches diameter.

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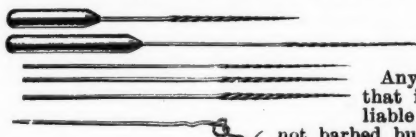


This is something entirely new in the way of a Brush for cleaning the teeth. They are the smallest Hub Brushes made. Cuts are full size. The hubs are metal, and the brush is so constructed that the bristles are held in place by wedging. As no glue or cement is used to hold the bristles in place, these brushes can be sterilized by boiling in water.

These Brush Wheels are put up on cards, one dozen on a card, and are not sold in smaller quantity. Unless otherwise ordered, they are put up assorted, four flat wheels and eight cups on each card. They can be furnished all flat or all cups if desired.

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Do Not Break.

Any broach or any piece of steel that is barbed or notched is very liable to break. These broaches are not barbed but are made in the form of a screw, which extracts the nerve much better than a barbed broach and will not break. Can be twisted up or tied in a knot without breaking. Made of the toughest steel known. Made to go into a smaller canal than any other broach. Made in regular length without handles, regular length with metal handles, and short with handles, for molars.

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There are but few dentists who have not had the annoying experience of breaking off Nerve Canal Reamers down in the canals, and all who have will appreciate a Reamer which will not break under any circumstances. These Reamers are just what the name implies, unbreakable. They are worked out of the toughest known spring tempered steel, and are very much tougher than any Reamer can be made by tempering after it is formed.

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Very respectfully,
S. J. DOWNS.

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P. S.: I find that no other local anesthetic can do the work so well as Odontunder.



Odontunder will not deteriorate. Every bottle guaranteed. Cash to accompany order of goods sent C.O.D.

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So generally is Odontunder used that we guarantee to send you the name of some friend or classmate who is using it, with whom you can correspond.

Single Bottles, 2 oz., \$2.00 by Express.
Three Bottles, 6 oz., \$5.00 by Express Prepaid.
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Beware of any one else offering Odontunder for sale or claiming to have bought the formula. Odontunder is sold only from the house direct.

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(Eucain Hydrochlorate "B.")

In a report made at the Academy of Medicine, Paris, March 29, 1898, published in the *Bulletin Medical* of March 30, 1898, **Professor Reclus** stated:

"Beta-Eucain possesses a number of indubitable advantages. In the first place, its solution can be boiled without undergoing decomposition, thus permitting it to be sterilized by heat. This cannot be done with cocain.

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Patent pending.

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CASH PRICE—Plain Teeth only;

1 x 14, 50c	11 x 14, \$5.00	23 x 14, \$10.00
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We Sell "TWENTIETH CENTURY TEETH" ...

Artistic Moulds—Finest Material—Perfect Platinum
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This is our talking point, that no two crowns are exactly alike, any more than artificial plates for different mouths are alike.

The Berry crown is made for the place it is intended by first fitting a narrow measure band to the root, an open band that you can look through and see the root and know that the band fits. All the other parts of the process is machine work giving the most accurate results ever arrived at in gold crown work.

Send for our free book on crown-making. It will tell you about the way it is done and it costs you nothing.

Price of Machine, \$15.00

Berry Dental Mfg. Company
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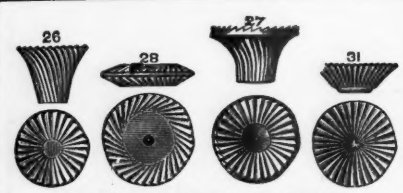
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For more than twenty years sold under the trade-mark, "BOW SPRING."

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Goodyear Crown Black. (Gray Black)	$\frac{1}{4}$ pound box at.....	\$0.50 per box
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Goodyear Crown Ethiopian. (Jet Black.)	$\frac{1}{4}$ pound box at.....	\$0.50 per box
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Goodyear Crown Maroon.	$\frac{1}{4}$ pound box at.....	\$0.50 per box
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Goodyear Crown Dam	Box containing 5 yds. 6 in. wide, thin.....	\$1.00
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Goodyear Crown Corrugated Soft Rubber Points.



PRICE PER DOZEN, 30 CENTS

MANY testimonials as to the merits of the Goodyear Crown Pink and Ethiopian Gums have been received.

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Gold Foil, $\frac{1}{8}$ -oz.....	\$ 3 25	24K Gold Wire. Per dwt.....	\$ 1 15
Gold Foil. Per oz.....	25 00	Platinum Sheet or Wire. Per	
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18K " " ".....	85	Columbian Alloy. \$2.00 per	
20K " " ".....	95	oz.; 3 oz. for.....	5 00
Coin " " ".....	1 00	65 Silver, 35 Tin Formula, \$1.00	
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Platinum Pins, 1c cash. 1 $\frac{1}{2}$ c in trade.		Bench and Floor Sweepings Refined.	

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Pure Gold Cylinders, Gold Ropes, Crystal Surface Rolled Gold,
 $\frac{1}{8}$ oz. \$4.00. $\frac{1}{2}$ oz. \$15.00. 1 oz. \$29.00.

Fine Gold Foil, $\frac{1}{8}$ oz. \$3.50. $\frac{1}{2}$ oz. \$14.00. 1 oz. \$27.00.

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Full Nickel-Plated
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Gold and Gas Trap.
 Requires little
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Made in our own
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Price, either style, \$40.00

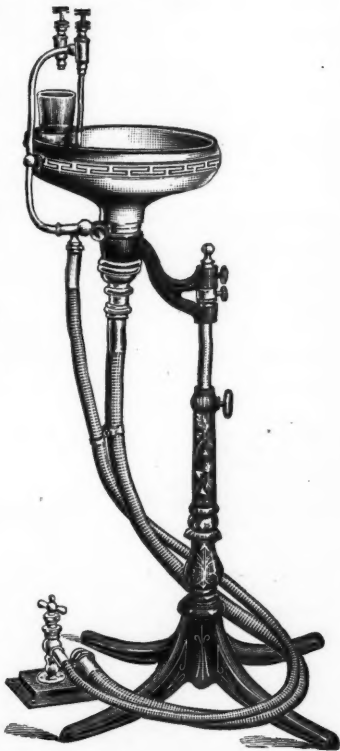
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Enough to fill 1,000 root
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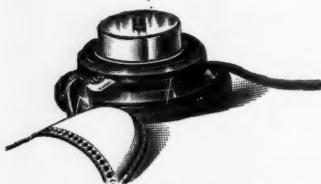
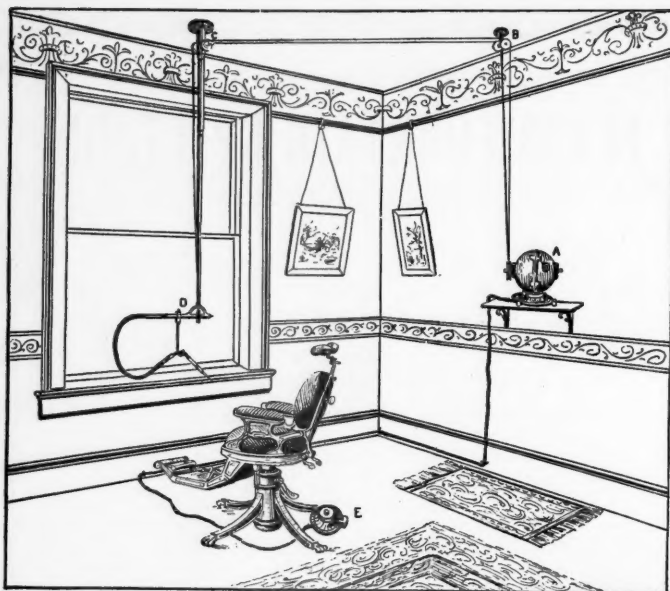
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New Electric Dental Engine for the 110-Volt Direct Current
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This outfit consists of motor, rheostat (with ten feet of electric wire cable), ceiling bracket (either oxidized or nickel plated) swinging on a friction joint that holds engine head in any position around the chair, one pair ceiling pulleys, engine head, cable, sleeve, flexible attachment and coil spring, handpiece and fifty feet of engine cord.

The rheostat will give four speeds with instantaneous reverse or stop.

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